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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/266,975	10/08/2002	Richard Sapienza	1028-001F	7503

7590 04/30/2004

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MAY 3 2004
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EXAMINER	
GREEN, ANTHONY J	
ART UNIT	**PAPER NUMBER**
1755	

DATE MAILED: 04/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

CASE 1028-001F ATTY ABC
DUE DATE July 30, 2004
STATUTORY DATE October 30, 2004
BY WF

PTO-90C (Rev. 10/03)

Office Action Summary	Application No.	Applicant(s)
	10/266,975	SAPIENZA ET AL.
	Examiner	Art Unit
	Anthony J. Green	1755

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *36-44,46 and 48-52* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *36-44,46 and 48-52* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *06/16/03*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This office action is in response to the amendment submitted on 04 March 2004. Upon further reconsideration it is the position of the examiner that applicant has not properly overcome the previously made 112 paragraph 1 rejections and accordingly they are repeated again below. With respect to the 102(e) rejections, applicant has shown that they are entitled to an effective filing date that is before the effective filing dates of US Pat No. (6,299,793; 6,436,310 and 6,440,325) and accordingly the previously made 102(e) rejections are withdrawn. Upon the indication of allowable subject matter the examiner will institute an interference with the above US Patents. See MPEP 2306.1. With respect to the obviousness-type double patenting rejections a terminal disclaimer over 6,544,434 has been received and recorded and the rejection over this patent is overcome. Applicant states that terminals over the other 2 patents (6,129,857 and 6,315,919) were submitted however they were not received by the office and accordingly the rejections are repeated. Currently claims 36-44, 46 and 48-52 are pending.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 38-44, 46 and 48-52 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.

The subject matter of these claims which were added by preliminary amendment fails to lack proper support in the specification as originally filed. While it is noted that applicant's have provided a chart showing wherein the support lies, it is the position of the examiner that this does not adequately show support for the claimed subject matter. The subject matter that lacks support is identified as follows:

- In claim 38: the range of "3 to 60" for the carbohydrate, the range of "5 to 35" for the chloride salt, and the range of "180 to 1500" for the molecular weight. Applicant's specification recites a range of "5 to 100" for the freezing point depressant, nowhere is a range of from "3 to 60" for carbohydrate or "5 to 35" for chloride recited. As for the molecular weight applicant has support for the range of "180" but does not have support for the entire range.

- In claim 40: the range of "3 to 60" for the carbohydrate, the range of "5 to 35" for the chloride salt, and the range of "180 to 1000" for the molecular weight. Applicant's specification recites a range of "5 to 100" for the freezing point depressant, nowhere is a range of from "3 to 60" for carbohydrate or "5 to 35" for chloride recited. As for the molecular weight applicant has support for the range of "180" but does not have support for the entire range.

- In claim 41: the range of "3 to 60" for the carbohydrate and the range of "5 to 35" for the chloride salt. Applicant's specification recites a range of "5 to 100" for the freezing point depressant, nowhere is a range of from "3 to 60" for carbohydrate or "5 to 35" for chloride recited.

- In claim 42: the range of "3 to 60" for the carbohydrate, the range of "5 to 25" for the calcium magnesium acetate, and the range of "180 to 1500" for the molecular weight. Applicant's specification recites a range of "5 to 100" for the freezing point depressant, nowhere is a range of from "3 to 60" for carbohydrate or "5 to 25" for calcium magnesium acetate recited. Nowhere is calcium magnesium acetate expressly recited. As for the molecular weight applicant has support for the range of "180" but does not have support for the entire range.

- In claim 43: the range of "3 to 60" for the carbohydrate, the range of "5 to 40" for the potassium acetate, and the range of "180 to 1500" for the molecular weight. Applicant's specification recites a range of "5 to 100" for the freezing point depressant, nowhere is a range of from "3 to 60" for carbohydrate or "5 to 40" for potassium acetate recited. As for the molecular weight applicant has support for the range of "180" but does not have support for the entire range.

- In claim 44: the range of "3 to 60" for the carbohydrate, the range of "5 to 20" for the sodium acetate, and the range of "180 to 1500" for the molecular weight. Applicant's specification recites a range of "5 to 100" for the freezing point depressant, nowhere is a range of from "3 to 60" for carbohydrate or "5 to 20" for sodium acetate

recited. As for the molecular weight applicant has support for the range of "180" but does not have support for the entire range.

- In claim 46: the range of "1 to 15" for the amino acid and the range of "3 to 25" for the acetate salt. Applicant's specification recites a range of "5 to 100" for the freezing point depressant, nowhere is a range of from "1 to 15" for the amino acid or "3 to 25" for the acetate salt recited.

- In claim 48: the range of "3 to 50" for the oligopeptide and the range of "5 to 25" for the acetate salt. Applicant's specification recites a range of "5 to 100" for the freezing point depressant, nowhere is a range of from "3 to 50" for oligopeptide or "5 to 25" for acetate salt recited. Also, no specific support for oligopeptide is recited. It is the position of the examiner that the recitation of a protein would not necessarily provide support for an oligopeptide absent evidence showing otherwise.

- In claim 49: the range of "3 to 60" for the carbohydrate, the range of "5 to 25" for the acetate salt, the range of "1 to 15" for the amino acid and the range of "180 to 1500" for the molecular weight. Applicant's specification recites a range of "5 to 100" for the freezing point depressant, nowhere is a range of from "3 to 60" for carbohydrate, "5 to 25" for the acetate salt, and "1 to 15" for the amino acid recited. Nowhere is an example of the combination of the 3 components recited. As for the molecular weight applicant has support for the range of "180" but does not have support for the entire range.

- In claim 50: the range of "3 to 60" for the carbohydrate, the range of "5 to 25" for the acetate salt, the range of "3 to 30" for the oligopeptide and the range of "180 to 1500" for the molecular weight. Applicant's specification recites a range of "5 to 100" for

the freezing point depressant, nowhere is a range of from "3 to 60" for carbohydrate, "5 to 25" for the acetate salt, and "3 to 30" for oligopeptide recited. Nowhere is an example of the combination of the 3 components recited. As for the molecular weight applicant has support for the range of "180" but does not have support for the entire range.

- In claim 51: the range of "3 to 50" for the oligopeptide, the range of "1 to 15" for the amino acid, and the range of "5 to 25" for the acetate. Applicant's specification recites a range of "5 to 100" for the freezing point depressant, nowhere is a range of from "3 to 50" for the oligopeptide, "1 to 15" for the amino acid and "5 to 25" for the acetate salt recited. Nowhere is an example of the combination of the 3 components recited.

- In claim 52: the range of "3 to 60" for the carbohydrate, the range of "3 to 30" for the oligopeptide, the range of "1 to 15" for the amino acid, the range of "5 to 25" for the acetate salt, and the range of "180 to 1500" for the molecular weight. Applicant's specification recites a range of "5 to 100" for the freezing point depressant, nowhere is a range of from "3 to 60" for carbohydrate, "3 to 30" for oligopeptide, "1 to 15" for the amino acid and "5 to 25" for the acetate salt recited. Nowhere is an example of the combination of the 4 components recited. As for the molecular weight applicant has support for the range of "180" but does not have support for the entire range.

Applicant is reminded that claims need not be identical to be interfering with claims of the patents in question. The overlapping subject matter of the claims is that which would be in interference.

Double Patenting

4. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

5. Claims 36-37 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 18-27 of U.S. Patent No. 6,315,919. Although the conflicting claims are not identical, they are not patentably distinct from each other because the reduction to practice of the claims of the prior patent would render obvious the instant claims.

Applicant states in a response that a terminal disclaimer has been provided to overcome this rejection however no terminal disclaimer based on the instant patent number has been received and recorded by the office.

6. Claims 36-37 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 18-27 of U.S. Patent No. 6,129,857. Although the conflicting claims are not identical, they are not patentably

distinct from each other because the reduction to practice of the claims of the prior patent would render obvious the instant claims.

Applicant states in a response that a terminal disclaimer has been provided to overcome this rejection however no terminal disclaimer based on the instant patent number has been received and recorded by the office.

7. Claim 37 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-26 of U.S. Patent No. 5,980,774. Although the conflicting claims are not identical, they are not patentably distinct from each other because the reduction to practice of the claims of the prior patent would render obvious the instant claims.

The reference teaches, in the claims, the use of a hydrocarbyl aldoside in combination with a freezing point lowering additive such as boric acid salts. The instant claims are encompassed by the claims of the prior patent.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 36-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nimerick et al (US Patent No. 4,388,203).

The reference teaches, in the claims, and in column 2, lines 20+, a thawing agent comprising a polyhydroxy compound or monoalkyl ether thereof, an organic nonvolatile component having at least one hydrophilic group, an inorganic salt, and an organic polymer. Column 2, lines 48+ recite that the polyhydroxy compound may be selected from a sugar.

The instant claims are obvious over the reference. While the reference does not specifically teach that the sugar is a hydrocarbyl aldoside, sucrose, maltose or glucose, it is the position of the examiner that since the reference teaches the use of a sugar, any well known type of sugar would be utilizable in the composition of the reference absent evidence to the contrary. As for the amounts, the amounts taught or suggested by the reference encompass those instantly claimed. Accordingly it would have been obvious to utilize any type of sugar for the sugar of the reference absent a showing otherwise and thus arrive at the instant invention.

Information Disclosure Statement

10. Applicant has submitted a supplemental information disclosure statement that states that a copy of a brief and another document labeled "CA" and "CB" have been submitted however a 1449 and the documents have not been received by the office.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony J. Green whose telephone number is 571-272-1367. The examiner can normally be reached on Monday-Thursday 6:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark L. Bell can be reached on 571-272-1362. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Anthony J. Green

Anthony J. Green
Primary Examiner
Art Unit 1755

ajg
April 28, 2004

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF NEW YORK

CARGILL, INCORPORATED,

Plaintiff,

vs.

Civil Action No.
5:03-CV-0530 (DEP)

SEARS PETROLEUM & TRANSPORT CORP., and SEARS ECOLOGICAL APPLICATIONS CO., LLC,

Defendants.

APPEARANCES:	OF COUNSEL:
FOR PLAINTIFF:	
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DAVID E. PEEBLES
U.S. MAGISTRATE JUDGE

DECISION AND ORDER

This action has as its genesis a commercial dispute between plaintiff Cargill, Incorporated ("Cargill"), one of the world's largest privately-held companies with operations centered around the manufacture and sale of agricultural products, and defendant Sears Petroleum Transport Corporation ("Sears"), a family-run petroleum products company headquartered in upstate New York.[1] At the heart of this multi-faceted controversy is United States Patent No. 6,299,793 (the "'793 patent") issued in October of 2001, and assigned to Sears, as well as the invention which that patent teaches. The claims associated with the '793 patent

[1] Sears Ecological Applications Co., LLC ("SEACO"), a Sears affiliate, is also named as a defendant in the action. Since SEACO's role in this controversy is limited, unless otherwise noted the term "Sears" as used herein will refer solely to Sears Petroleum Transport Corporation.

describe a low molecular weight carbohydrate and salt based composition developed to address problems associated with roadway icing, although the language of the claims contained within the patent does not specifically limit use of the patented product solely to direct application upon road surfaces.

Currently pending before the court is an application by the parties for construction of certain disputed terms within the '793 patent, as well as cross-motions for summary judgment addressing various issues presented in the case surrounding the patent claims and defenses asserted by the parties including, *inter alia*, infringement, patent unenforceability, patent invalidity, and willful infringement. Cargill also seeks summary dismissal of common law counterclaims asserted by Sears, stemming from defendants' contention that prior to issuance of the '793 patent Cargill misappropriated and used to its own commercial benefit the principles associated with the underlying invention.

I. BACKGROUND

A. Evolution and Prosecution of the '793 Patent

Development of the invention forming the basis of the '793 patent was driven by a perceived need for an improved roadway de-icing agent

lacking in certain undesirable characteristics linked to previously available commercial products. According to background information set forth in the patent, products used in the past by municipalities and others for preventing or removing ice and snow buildup on pavement surfaces were found to possess inherently undesirable traits, including the tendency to promote corrosivity and environmental contamination.

Prompted by a desire to develop de-icing agents which did not exhibit these deleterious features, the industry turned to alternative formulations including those utilizing agricultural waste materials and by-products as base constituents. Prior art cited in the '793 patent references products derived from a wet milling process of shelled corn, soaked in a hot solution concerning sulphurous acid, yielding steep water solubles used in the de-icing product; a composition which included an "admixture of waste concentrate of alcohol distilling"; and a composition "formed from a waste product of the process of removing sugar from sugar beet molasses, also known as desugared sugar beet molasses." Marks Invalidity Aff. Exh. 1, col. 1, lns. 28-48.[2]

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[2] The '793 patent at issue in this case is included in various places in the record, including Marks Invalidity Aff. Exh. 1, and Hansen Aff. Exh. A. It will be hereinafter cited simply as the "'793 patent."

The problems associated with these earlier organic products using agricultural residues, including brewers condensed solubles ("BCS"), as a base element included extreme variations in composition, viscosity, film forming tendency, freezing temperature, and other functional aspects, resulting in potentially greatly varied performance from batch to batch.[3] The presence of "highly undesirable or unnecessary ingredients", including high organic contents, phosphorous compounds and heavy metals, in such earlier products also led to additional problems such as "stratification in storage, biological degradation, odor, plugging of filters and spray nozzles and environmental difficulties[.]" '793 patent, col. 1, ln. 67; col. 2, ln. 24.

To address these undesirable qualities associated with earlier formulations, the co-inventors of the '793 patent – David Wood, a Sears employee, and Robert A. Hartley, a Canadian chemist – set out to meet "an immediate need for synthetic, chemically modified thickeners, and carefully purified materials which can be substituted for the currently used agricultural residues . . . [to] improve performance and reduce metal corrosion, spalling of concrete, toxicity and [address] environmental

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3 As will be seen, the viscosity of a substance generally describes its flow characteristics. *See* p. 28, n.11, *post*.

concerns." '793 patent, col. 2, lns. 8-13. Among the objects of the invention listed in the '793 patent is the desire to provide 1) "a deicing formulation which exhibits improved performance standards which overcomes [sic] the prior art problems described above"; 2) "a deicing formulation which utilizes a synergistic combination of a low molecular weight carbohydrate and an inorganic freezing point depressant"; 3) "for improved ice melting properties and . . . less corrosion"; 4) "consistent physical and chemical properties, thereby assuring consistent quality and performance"; and 5) "an economical, highly effective deicing formulation." '793 patent, col. 2, lns. 14-32.

Upon determining that the principal organic components of the prior art formulations consisted of carbohydrates, the '793 inventors set about testing to probe the efficacy of the use of carbohydrates to formulate a more consistent and effective de-icing agent. In one set of tests BCS was diluted and divided into several fractions, which were then added to a mixture of ethanol and methanol, mixed with magnesium chloride in varying proportions, and assayed to determine their effects upon freezing point depression. Testing, including that calculated to identify the active constituents of BCS, revealed to the inventors that low molecular weight

carbohydrates had the greatest impact on freezing point depression when mixed with magnesium chloride.

The inventors next identified several potential sources of carbohydrates in the low molecular weight range of less than 1,000, including glucose/fructose (180), disaccharides (342), trisaccharides (504), tetrasaccharides (666), centasaccharides (828), and hexasaccharides (990). Potential commercial sources of such low molecular weight carbohydrates were listed by the inventors in the '793 patent to include Corn Syrup Solid DE 44, high maltose corn syrup, high fructose corn syrup, and glucose.

Inventors Wood and Hartley initiated the patent prosecution process by the filing of utility patent application no. 09/224,906, on January 4, 1999. *See* Hansen Aff. Exh. C. That application, which has been referred to by the parties as a parent non-provisional application, and has been abandoned by the inventors, claimed an invention using a combination of three key components to formulate a de-icing composition which did not exhibit the problems associated with the cited prior art. Those components were described to include a freezing point depressant, which could consist of "any suitable inorganic or organic material and mixtures

thereof", which could include either a chloride and/or an organic substance such as, notably, sugars (hexoses, saccharides) and an array of other potentially suitable components; a film former, comprised of "any suitable water soluble or water resoluble material"; and water. *Id.* While the film former is described in that application as intended to immobilize the freezing point depressant to prevent runoff from the road surface to which it is applied, it is also described as "itself a freezing point depressant" with the resulting effect of "further improv[ing] the efficiency of ice melting and aid[ing] in the reduction of metal corrosion[.]" *Id.*

On January 7, 1998 inventors Hartley and Wood filed provisional application no. 60/070,636. Hansen Aff. Exh. B. That application disclosed the same concept of using the combination of a freezing point depressant, a film former, and water in a refined form to overcome the problems associated with then-existing de-icer formulations, as was the subject of the earlier parent non-provisional application. *See id.*

While Sears has not altogether abandoned its claim of priority dating back to the provisional parent application filed on January 4, 1999, it acknowledges experiencing the serendipity which ultimately led to the issuance of the '793 patent in December of 1998, when it received a

report from Bodycote Ortech, Inc. ("Bodycote"), a Canadian materials testing laboratory engaged at the request of inventors Wood and Hartley to conduct testing regarding the characteristics of Ice Ban – an existing, commercially available de-icing product. That report disclosed a synergism between the magnesium chloride and the Ice Ban. In analyzing the Ice Ban product Bodycote isolated five primary constituents, and discovered that one of those five components, identified as "Fraction E", consisted predominantly of carbohydrates appearing to be low molecular weight saccharides, or sugars. On December 31, 1998 Sears received a supplemental report stating that "lower molecular weight [carbohydrates] appear[ed] to produce the greatest influence on the freezing point of the solution." Hansen Aff. Exh. T, at SP01024.

Wood and Hartley filed continuation-in-part ("CIP") application no. 09/755,587, the application which ultimately resulted in issuance of the '793 patent, on January 5, 2001. Hansen Aff. Exh. D. In that application, the inventors disclosed ten references to prior art, including nine de-icer patents containing agricultural waste product constituents.[4]

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[4] Among the prior art disclosed were patent nos. 4,664,832, issued to Sandvig ("waste products such as sawdust"); 4,676,918, issued to Toth, *et al.* ("waste concentrate of alcohol distilling"); 5,135,674, issued to Kuhajek ("gelling agent such as hydroxethyl cellulose"); 5,635,101, issued to Janke, *et al.* (by-products of a wet milling

Following review of the application by Patent and Trademark Office ("PTO") Examiner Greene, certain of the claims in the application were initially rejected based upon that prior art, including the Janke '813, Johnson and Gambino patents. Examiner Greene commented that the prior art already taught the use of products containing carbohydrates, and that the choice of molecular weight range is "a matter of obvious choice or design best determinable through routine experimentation and optimization within the art and producing no unexpected results absent a showing otherwise." Hansen Aff. Exh. E, at 3-4.

In response to these concerns, Wood cited research by co-inventor Hartley reflecting that the prior art involved components with "any number of extraneous, and frequently undesirable, compounds" that "either alone or in combination with magnesium chloride, . . . were producing the various problems" encountered with the prior products. Hansen Aff. Exh. F, at 2. Wood went on to note that the invention practiced by Wood and Hartley was designed to "develop a more pure liquid for combining with

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process of shelled corn); 5,709,812, issued to Janke, *et al.* ("liquids that remain after the coagulated cheese has been removed from the milks"); 5,709,813, issued to Janke, *et al.* ("by-products from the fermentation and production of wine"); 5,849,356, issued to Gambino ("carbohydrates produced by wet processing"); 5,922,240, issued to Johnson ("by-products from a commercial beer brewing"); and 6,080,330, issued to Bloomer ("waste product of the process of removing sugar" from sugar beet molasses).

the magnesium chloride (or other chloride salts) that would eliminate the problems noted . . . as well as provide uniform performance and quality to the market." *Id.* After amendment of the application to specify not only the molecular weight range of the carbohydrate component but additionally a listing of potential sources for that element, the claims were subsequently allowed, and the '793 patent was issued on October 9, 2001.

B. <u>The Parties' De-Icing Industry Business Ventures</u>

Neither Cargill nor Sears is a stranger to the commercial de-icing business. Cargill notes that it has been involved in the winter highway maintenance industry for approximately forty years, and during more than twenty of them has focused considerable efforts on technology related to ice melting, corrosion reduction, and environmental safety. For approximately fifteen of those years, Cargill has manufactured and sold de-icing and anti-icing products, and in October of 2000 began selling the ClearLane line of de-icing and anti-icing materials, which are at the heart of this matter.

For its part, Sears entered the commercial de-icing business in the late 1990s by way of a joint venture through which it distributed Ice Ban, a

liquid de-icer made from waste products of the brewing and corn milling industries. Along the way, Sears claims to have recognized the need for a new "synthetic" product, based on refined agricultural ingredients, to avoid or minimize the environmental and corrosive problems associated with prior products, including Ice Ban. Toward that end, in November of 1997 Robert Hartley, a Canadian-based chemist, was engaged to conduct scientific research, with the aid of Bodycote, ultimately yielding the December, 1998 discovery of the synergistic effect of combining low molecular weight carbohydrates with chloride salts.

On July 29, 1999 a meeting was held at Sears' offices in Rome, New York. In attendance were two Cargill employees, Richard Rose and Gerald Thornton, and representatives of Sears and its partner, Innovative Materials, U.S. ("IMUS"), including David Wood. The circumstances surrounding the genesis of that meeting are sharply disputed. Sears maintains that in the summer of 1999, Cargill approached Sears and proposed supplying it with agricultural products, and in turn purchasing Sears' finished de-icing products in bulk. According to Sears, such an arrangement would have been beneficial for a variety of reasons, including the fact that Cargill operated a large salt mine in nearby Lansing, New

York. Cargill, in contrast, maintains that it was Sears that first approached Cargill with a proposal to meet, after learning that Cargill was planning to meet with Ice Ban America, a Sears competitor.

Prior to the July 29, 1999 meeting, Cargill's Richard Rose faxed a letter to IMUS representative Crawford, with a copy to David Wood of Sears, pointing out that Cargill had been working to develop its own technology in the areas to be discussed, and advising Sears and IMUS that Cargill's "agreement to meet with you is contingent on your acknowledgment that no confidential or otherwise proprietary information shall be exchanged." Marks Trade Secrets Aff. Exh. 7. That letter went on to warn that information disclosed by Sears and/or IMUS during the meeting would not be regarded as confidential or proprietary, and there would be no limitation on Cargill's right to use or disclose any such information. *Id.*

As will be seen, there is also sharp disagreement over the extent of disclosure of the claims forming the basis of the '793 patent during the July 29, 1999 meeting, which lasted approximately one hour. Cargill contends that several references in the record, including deposition testimony of David Wood, strongly suggests that the specifics of the

invention were disgorged during that meeting. Sears, nonetheless, maintains that the patent application and underlying technology were only generally discussed in a preliminary way during that initial session, with a view toward more complete disclosure during subsequent, follow-up meetings.

A second, day-long session was conducted between Sears and Cargill representatives at Cargill's facility in North Olmstead, Ohio on August 25, 1999. As a prelude to that day-long meeting, the parties entered into a written confidentiality agreement which was to govern the exchange of information during those talks. *See* Marks Trade Secrets Aff. Exh. 9. At that meeting Sears discussed the development of its new "synthetic" de-icing product, and its discovery that low molecular weight carbohydrates, in combination with magnesium chloride, produced enhanced freezing point depressive characteristics. Also discussed at the second session were marketing, sales, and pricing issues as well as the future market potential for the new product.

Shortly after the Ohio meeting, Cargill terminated discussions with Sears concerning a business relationship between the two entities. The explanation given by Cargill regarding that abrupt termination was based

upon its discovery, following the second meeting, that Sears personnel had discussed with its customers a possible business relationship with Cargill – a matter which Cargill viewed as a breach of the parties' confidentiality agreement. Despite Sears' acceptance of responsibility for the secrecy breach and a request for further meetings to discuss a possible business venture, no further talks were held between the parties.

On June 4, 2002 United States Patent No. 6,398,979 (the "'979 patent") was issued and assigned to Cargill. Hansen Reply Aff. Exh. AAA. That patent describes a de-icer containing molasses solids and magnesium chloride in proportions covered by the claims in the '793 patent. Throughout this litigation Cargill has claimed that its ClearLane brand de-icer line of products is covered by this '979 patent.

II. PROCEDURAL HISTORY

_____After being advised, including by letter dated October 12, 2001, of Sears' contention that it was infringing the '793 patent, Cargill commenced this action on February 22, 2002 in the Southern District of New York seeking a declaratory judgment to include, *inter alia*, a finding of noninfringement. Upon motion subsequently filed by defendant Sears, arguing the lack of any meaningful nexus between that court and the

parties or the existing controversy, the case was ordered transferred to this district on April 17, 2003.[5,6] *See* Dkt. No. 19.

Following completion of pre-trial discovery, both Sears and Cargill elicited the court's assistance with regard to claim construction. A hearing was held on June 29, 2004 to address the disputed claim terms. On the following day, oral argument was heard regarding various dispositive and non-dispositive cross-motions which have been interposed in the action.

III. DISCUSSION

A. Claim Construction .

As a threshold matter, a court confronted with patent infringement claims must construe any controverted provisions of the patent in issue. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 976 (Fed. Cir. 1995), *aff'd*, 517 U.S. 370, 116 S. Ct. 1384 (1996). Toward that end, I have been called upon by the parties to assist in the construction of several controversial portions of the claims set forth within the '793 patent. To assist in this endeavor, the parties presented their respective positions

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[5] Sears originally sought dismissal of Cargill's complaint. Dkt. No. 8. That motion was denied by order issued by District Judge Denny Chin on October 28, 2002, resulting in the subsequent filing of a venue transfer motion. Dkt. Nos. 15, 19-20.

[6] Since the transfer to this court, the parties have consented to my jurisdiction in the case, which accordingly has been referred to me for all purposes pursuant to 28 U.S.C. § 636(c). Dkt. No. 61.

regarding the disputed claim terms during the *Markman* hearing, both in the form of oral argument, and through the testimony of Dr. E. Bruce Nauman, a Professor of Chemical and Biological Engineering at the Rensselaer Polytechnic Institute, offered by Sears as a claim construction expert, and Dr. Wilfred A. Nixon, a Civil and Environmental Engineering Professor at the University of Iowa with highway maintenance experience, who was called on behalf of Cargill.[7]

Patent claim construction begins with the non-controversial premise that the issue is one of law, to be decided by the court. *Markman*, 52 F.3d at 979; *see also Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1304 (Fed. Cir. 1999) (citing *Markman*). When engaged in patent construction, a court must construe claims as one of ordinary skill in the relevant art would understand and interpret them. *Markman,* 52 F.3d at 986; *see also K-2 Corp. v. Salomon S.A.,*191 F.3d 1356, 1365 (Fed. Cir. 1999).

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[7] A vast array of other materials have been supplied by the parties in support of their respective claim construction positions, including an expert report of L. David Minsk, who possesses a bachelors of science degree in chemistry and a masters of science in physics and is identified and offered by Sears as an expert in the field of snow and ice control and removal, and Cameron K. Weiffenbach, a former PTO employee and currently a patent attorney affiliated with a large law firm, advanced by Cargill as an expert in several areas, including in patent prosecution. Neither Minsk nor Weiffenbach was called to testify during the claim construction hearing.

The Federal Circuit's decision in *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576 (Fed. Cir. 1996), is widely regarded as defining the contours of the claim construction inquiry. Under *Vitronics*, a court should look first to the intrinsic evidence of record, including the patent itself and its express claims; the specification; and any available prosecution history in order to inform the construction analysis. *Id.* at 1582. A court engaged in claim construction must bear in mind the paramount consideration that the intrinsic evidence, including the patent itself, specification, and file history – all matters of public record – should control wherever possible, since it is this record upon which competitors and others must rely in order to determine the scope and extent of the protected rights associated with the patent in issue. *Id.* at 1583.

Perhaps the most definitive sources of guidance concerning the construction of a claim are the words found within it. *See id.* at 1582. Words contained within a patent should normally be given their ordinary and customary meaning, unless the patent prosecutor has chosen to set forth specific, nontraditional definitions of the particular term in the patent specification or file history. *Id.* When divining the ordinary meaning of a claim term, courts generally afford first-level consideration to dictionary

definitions revealing the ordinary meaning of particular claim terms.[8] *Altiris, Inc. v. Symantec Corp.*, 318 F.3d 1363, 1369 (Fed. Cir. 2003) (citing *Texas Digital Sys., Inc. v. Telegenix, Inc.*, 308 F.3d 1193, 1202 (Fed. Cir. 2002)); *see also CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366-67 (Fed. Cir. 2002). Technical treatises and dictionaries may also be used by the court at any time in construing terms, provided that the dictionary definitions do not contradict the express or implied meaning set forth in the patent record. *Vitronics*, 90 F.3d at 1584 n.6; *Canton Bio-Medical, Inc. v. Integrated Liner Techs., Inc.*, 19 F. Supp.2d 22, 28 n.2 (N.D.N.Y. 1998) (Scullin, J.) (citing *Vitronics*), *aff'd*, 216 F.3d 1367 (2d Cir. 2000).

In addition to the express terms of a patent claim, the patent specification, which is akin to an internal dictionary, must be reviewed to

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[8] It is true that dictionary definitions, like technical treatises, are properly regarded as extrinsic, rather than intrinsic, evidence. *Vitronics*, 90 F.3d at 1584 n.6. Despite this status, the *Vitronics* court noted that such sources "are worthy of special note", observing that

> [j]udges are free to consult such resources at any time in order to better understand the underlying technology and may also rely on dictionary definitions when construing claim terms, so long as the dictionary definition does not contradict any definition found in or ascertained by a reading of the patent document.

Id.

determine whether the inventor has used any term in a manner inconsistent with its ordinary meaning; "'[c]laims must be read in view of the specification, of which they are a part.'" *Vitronics*, 90 F.3d at 1582 (citing *Markman*, 52 F.3d at 979). The specification is the "single best guide to the meaning of a disputed term." *Vitronics*, 90 F.3d at 1582. The specification must be considered as a whole, and all portions should be read in a manner that renders the patent internally consistent. *Budde v. Harley-Davidson, Inc.*, 250 F.3d 1369, 1379-80 (Fed. Cir. 2001). "Where the specification makes clear that the invention does not include a particular feature, that feature is deemed to be outside the reach of the claims of the patent, even though the language of the claims, read without reference to the specification, might be considered broad enough to encompass the feature in question." *Scimed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1341 (Fed. Cir. 2001).

The third category of relevant intrinsic evidence to be considered is the prosecution history surrounding the patent. The prosecution history, which is customarily though not always offered to assist the court in fulfilling its claim construction responsibilities, is comprised of the complete record of proceedings before the PTO, including any express

representations made by the applicant regarding scope of the claims being made, and an examination of the prior art. *Vitronics*, 90 F.3d at 1582-83. Such evidence, which normally chronicles the dialogue which occurs with the PTO and provides reliable indication of any limitations or concessions on the part of the applicant, can often be highly instructive in the issue of claim construction. Accordingly, courts supplied with such evidence strive to avoid definitions upon which the PTO could not reasonably have settled in order to ensure against the possibility of an applicant obtaining a scope of protection which encompasses subject matter that, through the conscious efforts of the applicant, the PTO did not examine. *Genentech, Inc. v. Wellcome Foundation Ltd.*, 29 F.3d 1555, 1564 (Fed. Cir. 1994). Similarly, representations made in an attempt to overcome objections by the patent examiner provide particular enlightenment in construing claims and estopping inventors from later attempting to broaden their arguments beyond the scope of those presented in the PTO. *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., Ltd.*, 535 U.S. 722, 733-34, 122 S. Ct. 1831, 1838-39 (2002).

If analysis of the available intrinsic evidence resolves ambiguity of a disputed claim term, the inquiry ends there. *Vitronics*, 90 F.3d at 1583. If,

on the other hand, there remains genuine ambiguity in the claims after consideration of all available intrinsic evidence, the court should next examine available extrinsic evidence, including expert testimony, inventor testimony, dictionaries, and technical treatises and articles, for guidance in reconciling any conflicting intrinsic indicators. *Id.* at 1584. Such extrinsic evidence may only be used to help the court understand the claims, however, and does not justify any departure from or contradiction with the claim language. *Id.* To assist in resolving ambiguity, a court may in its discretion admit and rely on prior art, whether or not cited in the specification or file history. *Id.* at 1584-85. Prior art and dictionaries, as publicly accessible, objective information, are for obvious reasons preferable to expert testimony as tools for resolving ambiguity. *Id.* at 1585; *see also Texas Digital Sys.*, 308 F.3d at 1202-03.

Ultimately, interpretation of patent claim terms can only be determined with full understanding of what the inventors actually invented and intended to envelop within the claim. *Renishaw PLC v. Marposs Societa'per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998). For this reason, when inventors distinguish their invention from prior art, that prior art is properly excluded from the claims' coverage. *Ortho-McNeil Pharm., Inc.*

v. *Mylan Labs., Inc.*, 267 F. Supp.2d 533, 543 (N.D. W. Va. 2003) (citing *SciMed Life Sys., Inc.*, 242 F.3d at 1343.

Throughout its presentation Cargill has urged the court to approach claim construction from a perspective which takes into account the intended embodiment of the invention as having been principally designed to assist in the control of snow and ice on roadways. "[W]hile it is true that claims are to be interpreted *in light of* the specification and with a view to ascertaining the invention, it does not follow that limitations from the specification may be read into the claims[.]" *See Sjolund v. Musland*, 847 F.2d 1573, 1581 (Fed. Cir. 1988) (emphasis added). As another judge of this court has observed, "[n]or should particular embodiments in the specification be read into the claims; the general rule is that the claims of a patent are not limited to the preferred embodiment." *Cornell Univ. v. Hewlett-Packard Co.*, 313 F.Supp.2d 114, 126 (N.D.N.Y. 2004) (Mordue, J.) (citing, *inter alia*, *Texas Digital Sys.*, 308 F.3d at 1204). I have therefore interpreted the '793 patent in a manner which admits of other, non-roadway uses, though mindful of the history and context in which the invention was developed.[9]

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[9] As will be seen, I specifically reject Cargill's assertion that the '793 patent teaches a product whose use is limited to direct roadway application. *See* pp. 29-32,

The '793 patent presents four independent claims, including claims one, four, seven and eight. Each independent claim describes a "de-icing and anti-icing composition comprising an aqueous solution which contains a low molecular weight carbohydrate", together with a chloride salt, in constant proportions, by weight, of between three and sixty percent of carbohydrates and five to thirty-five percent chloride salt. '793 patent, col. 9, ln. 47-67-col. 12. Claims one and four limit the molecular weight of the carbohydrate ingredient to a range of 180 to 1500, while claims seven and eight refine the maximum allowable carbohydrate molecular weight to 1000. *Id.* Independent claims four and eight further provide for inclusion of a thickener within specified weight ranges. *Id.* Dependent claims two and five narrow the chloride salt component of the solution to be "at least one selected from the group consisting of sodium chloride, magnesium chloride and calcium chloride." *Id.* Dependent claims three and six allow for the inclusion of a "colorant to provide visual aid in applying the composition to a surface." *Id.*

1) Person Of Ordinary Skill In The Art

In addressing claim construction, the relevant inquiry for the court is

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post.

how a person of ordinary skill in the art would understand the claim terms at the time of the invention. *Markman,* 52 F.3d at 986. Put another way, patent claims must be construed not through the eyes of the court, or those of any proferred experts, but instead from the standpoint of a person skilled in the art. *Interactive Gift Express, Inc. v. Compuserve, Inc.,* 256 F.3d 1323, 1332 (Fed. Cir. 2001). In constructing the person of ordinary skill in the art, the court should consider the educational level of the inventor, the type of problems encountered in the art, the prior art solutions to the problems, the rapidity with which innovations are made, the sophistication of the technology, and the educational level of workers in the field. *Helifix Ltd. v. Blok-Lok, Ltd.,* 208 F.3d 1339, 1347 (Fed. Cir. 2000) (citation omitted). As one might gather, claim construction can often turn upon the court's definition of a person of ordinary skill in the art.

Not surprisingly, the parties differ somewhat markedly concerning the applicable relevant art to be applied in this case. Both parties agree that the "art" in question is that of chemical road de-icing and anti-icing.[10]

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[10] In its claim construction brief Sears makes this concession despite its potential inconsistency with the opinions of its expert, Dr. Nauman. In his claim construction report Dr. Nauman writes that because the '793 patent does not contain any claims specifying particular uses or applications of the de-icing solution taught, in his opinion "a person of ordinary skill in the art need not have specific knowledge in fields such as aviation deicing, marine deicing, railroad deicing, or highway deicing."

The parties' respective positions diverge, however, when it comes to the required level of practical experience in road de-icing and anti-icing, as well as the degree of sophistication necessary in the field of chemistry. Sears, noting that the patent teaches a chemical composition and not a process for removing ice and snow from roadways, urges a definition which would require a bachelors degree in chemistry or chemical engineering with continued work in the field since graduation. Cargill, in contrast, proposes a more relaxed requirement with regard to education, including a bachelors degree in physical science and at least four courses in chemistry, together with approximately five years of involvement in research, development or characterization of de-icing and anti-icing chemicals.

When analyzed in a vacuum, the claims set forth in the '793 patent seemingly support Sears' proposed requirement of a bachelors degree in chemistry or chemical engineering, without education or practical experience in the field of roadway de-icing. The claims teach a chemical composition containing, as the principal ingredients, carbohydrates –

Hansen Aff. Exh. I ¶ 6. Dr. Nauman's position is consistent with the precept, noted earlier, that terms should be interpreted without regard to a particular preferred embodiment of an invention. *See* pp. 22-23, *ante*.

polymers which can include simple sugars such as glucose and fructose as the monomers – and a chloride salt. Because the patent focuses upon the synergistic effect of these mixtures, as well as the addition of water, thickeners, and colorants, Sears argues that what is essential to understanding the '793 patent terms is an understanding of solution thermodynamics of chemical compositions in various states of equilibrium.

Cargill counters that one cannot overlook the fact that the invention practiced in the '793 patent sprung from a perceived need to improve over earlier products utilized as roadway de-icing and anti-icing agents. Accordingly, Cargill maintains, at least some level of understanding of the de-icing and anti-icing processes to which this invention could be put to use would be helpful. It is for this reason that Cargill proposes to define the person of ordinary skill in the art to include someone with additional practical experience in understanding de-icing and anti-icing beyond receipt of a bachelors degree in the physical sciences.

In arriving at a formulation to define the elusive person of ordinary skill in the art, I have considered the educational and practical experiences of the inventors. In this instance, co-inventor Robert A. Hartley, while – as Cargill argues – not possessing a bachelor's degree in

chemistry, apparently received an equivalent degree in the United Kingdom, and has extensive expertise in the field of chemistry extending well beyond that expected of a person of ordinary skill in the field. Co-inventor David H. Wood, while not a chemist, has practical knowledge of winter highway maintenance. It is this combination, in my view, that informs the definition of one with ordinary skill in the art. I will therefore define a person of ordinary skill in the art as possessing a bachelors degree, or the equivalent, in chemistry or chemical engineering, with some coursework in the field of organic chemistry, and additional post-graduate involvement in research or practical experience in the field of roadway ice management.

2. Construction of Claim Terms in Contention

The parties appear to be in agreement regarding the need for the court to construe the terms "de-icing and anti-icing composition," "aqueous solution," "carbohydrate" (referred to by Sears as "low molecular weight carbohydrate"), "chloride salt," "balance," "colorant," and "thickener." Although it does not appear to be controversial, Cargill also requests guidance concerning the claim term "viscosity."[11]

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[11] The term "viscosity" describes the fluidity of a liquid, and is sometimes defined as "internal resistance to flow exhibited by a fluid[.]" Hawley's Condensed

i) De-icing and Anti-icing Composition

The first disputed claim term to be construed is "de-icing and anti-icing composition." While the parties' positions regarding this term do not differ markedly, Cargill attempts to restrict the term to direct pavement and roadway usage, citing the genesis for the invention and its description within the patent as a basis for its argument. Sears opposes such a restrictive interpretation, countering that there is nothing in the claims themselves to limit the utility of the invention to roadways, and that it can and should be construed to extend to other areas where icing occurs.

Notwithstanding the parties' quarrel over this term, at first blush the phrase consists of simple, understandable and unambiguous words. The use of the prefix "de" before a word is commonly accepted to mean "[r]emove or remove from[.]" American Heritage Dictionary of the English Language 465 (4th ed. 2000). Similarly, use of the term "anti" to precede a word is defined to mean "[d]estroying[.]" *Id.* at 76. Consistent with these elementary definitions, the term "de-ice" is defined in one generally accepted dictionary as meaning "to keep free or rid of ice." Marks Claim

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Chemical Dictionary 1168 (14th ed. 2001), as cited in Marks Claim Construction Aff. Exh. 12. Since the parties do not appear to be in disagreement over this definition, it will therefore be attributed to the '793 patent claims.

Construction Aff. Exh. 6 (Websters Third New International Dictionary, (1993 ed.) 595).

Despite this more expansive reach of the words themselves, the phrase "de-icing and anti-icing composition" cannot be interpreted in a vacuum; instead, one must look to the patent as a whole, including the circumstances under which it was developed and the prior art described. Plainly, each of these sources is strongly suggestive of an intended use of the '793 invention to control ice on roads and other similar surfaces. Indeed, as Cargill argues when advocating a more restrictive definition than that propounded by Sears, the '793 patent describes the background of the invention in conjunction of snow and ice removal from roadways, and begins with the observation that "[t]he current state of the art for coping with snow and ice on roads usually involves applying a deicer material such as a salt to the road surface." '793 patent, col. 1, lns. 10-12. Similarly, as Cargill notes one of Sears' own experts, L. David Minsk, defines the terms de-icing and anti-icing in the context of pavement maintenance. Indeed, even Sears' own promotional material for its products and those of SEACO describes anti-icing as a "preventive/proactive strategy designed to prevent packed snow or ice

from bonding to pavement surfaces." Marks Claim Construction Aff. Exh. 9, at SP 03826.

Arguing in favor of a definition which restricts the de-icing and anti-icing composition to controlling ice on roadways, Cargill goes one step further, suggesting an additional circumscription which would require that the material be directly applied to the road or other pavement surface. I reject this additional limitation as unsupported by the patent claims and specification. Indeed, this position overlooks the language within the '793 patent itself which describes the inclusion of

> [t]hickeners which are used . . . to increase the viscosity of the compositions so that the liquid remains in contact with the road surface or with the solid particles in piles of rock salt/sand, or rock salt/aggregates, or rock salt alone, or sand or aggregate.

'793 patent, cols. 7, lns. 10-15. Cargill's description also ignores the following clarifying language:

> While the present invention has been particularly shown and described herein with reference to various preferred modes it will be understood by one skilled in the art that various changes in detail may be effected therein without departing from the spirit and scope of the invention as defined by the claims.

Id. col. 9, lns. 42-47. Clearly, the '793 patent itself contemplates a

composition whose utility is not necessarily limited to direct application on road pavement surfaces. *See Golight, Inc. v. Wal-Mart Stores, Inc.*, 355 F.3d 1327, 1331 (Fed. Cir. 2004) ("[t]he patentees were not required to include within each of their claims all of these advantages or features described as significant or important in the written description").

Based upon the foregoing, I construe the term "de-icing and anti-icing composition" as a composition whose intended purpose, through direct or indirect application, is to keep roadways free or rid of ice, or to prevent its formation on such surfaces.

ii) Aqueous Solution

The phrase "aqueous solution", while seemingly non-controversial, has become a significant battleground in this case. The parties' differences with respect to this term focus upon the extent to which incidental, insoluble components can exist in the specified aqueous solution. Cargill urges a definition requiring a "uniformly disbursed liquid mixture containing water as the primary solvent." Sears offers a more relaxed requirement of a "single-phase, liquid mixture of two or more components, one of which is water and with possible incidental amounts of insoluble components."

The term "solution" is defined in one source as constituting a "homogeneous mixture of two or more substances, which may be solids, liquids, gases, or a combination of these." American Heritage Dictionary, at 1655. The term "homogeneous" is defined elsewhere as "often loosely used to describe a mixture or solution composed of two or more compounds or elements that are uniformly disbursed in each other." Hawley's, at 577, as cited in Jackson Aff. Exh. 1. While both of those sources associate the term "homogeneous" with "solution," the Hawley's definition goes on to observe that "[a]ctually, no solution or mixture can be homogeneous; the situation is more accurately described by the phrase 'uniformly disbursed.'"[12] Hawley's, at 577, as cited in Jackson Aff. Exh. 1.

Use of the term "aqueous" constricts the solution in issue in the '793 patent to a liquid with water as a component, or even the primary solvent. This much is not in dispute. The critical issue presented is the degree of

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[12] In further support of its definition, Cargill offers a dictionary definition of "solution, true", which defines that term as

> [a] uniformly disbursed mixture at the molecular or ionic level, of one or more substances (the solute) and one or more other substances (the solvent). These two parts of a solution are called phases.

Hawley's, at 1031, as cited in Marks Aff. Exh. 11. Sears responds by correctly noting that the more restrictive term "true solution" is nowhere used in the '793 patent.

homogeneity required in the aqueous solution. As even the Hawley's dictionary definition recognizes, no solution or mixture can be entirely homogeneous. Moreover, both parties' experts have acknowledged that in practice, there are no solutions which are completely free of extraneous materials, however microscopic they may be. Indeed, even contemporary drinking water standards provide for inclusion of certain impurities including asbestos particles, albeit within exceedingly narrow defined limits.

In consideration of the patent claim language and use of the term aqueous, derived from aqua – which means "[w]ater", American Heritage Dictionary, at 89 – I interpret the phrase "aqueous solution" to mean a uniformly disbursed liquid mixture of two or more components, one of which is water, and which can contain incidental amounts of insoluble components.

iii) Low Molecular Weight Carbohydrate

Once again the parties disagree appreciably on the definition to be attributed to this phrase.[13] The term "carbohydrate" itself is not a

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[13] As Cargill correctly notes, it is the term "carbohydrate" that needs definition, since the claims themselves contain specific parameters addressing the permissible molecular weight range for the carbohydrate constituent. Nonetheless, the weight range specified as the likely sources of carbohydrates falling within those

controversial one; its definition specifies a "compound of carbon, hydrogen, and oxygen . . . in which the ratio of hydrogen to oxygen is the same as in water." Hawley's, at 206, as cited in Marks Aff. Exh. 11. As used in the '793 patent, however, the term is restricted to a carbohydrate with a "low molecular weight," and the carbohydrate source is further specifically limited as being "selected from the group consisting of glucose, fructose, and higher saccharides based on glucose and/or fructose and mixtures thereof."[14] '793 patent, col. 9, lns. 47-67-col. 12. The controversy in this instance centers around the source, including its purity and consistency, of the carbohydrate constitutent.

While the term "carbohydrate" is readily defineable, its use in the '793 patent must be considered in light of the limitations expressed, including the molecular weight range and the potential origins or sources of the designated carbohydrates. Indeed, both parties appear to be in

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ranges is an important consideration when determining the intended degree of purity, or refinement, of the carbohydrate source to ascribe to the framers of the '793 patent claims.

[14] With a specified molecular weight range of between 180 and 1500, the carbohydrates referred to in the '793 patent can contain a range of carbon atoms per sugar molecule of between six, corresponding to hexoses or monosaccharides, of which glucose and fructose are common examples, to a nonsaccharide. The largest molecule that falls within the more restrictive range of between 180 and 1000, which is set forth in claims seven and eight, is a hexasaccharide, with a molecular weight of 990 and containing thirty-six carbon atoms per sugar molecule.

agreement on this score. Citing various sources including the patent itself, Cargill urges a definition which requires that the carbohydrate be from a "pure and consistent source." For its part, Sears proposes to limit the allowable carbohydrates to those obtained from a "refined and consistent source." Both note, in support of their respective positions, prior art which was based upon use of agricultural residues and waste products that were notoriously impure and inconsistent.

While Cargill urges a definition which would require purity, there is nothing in the claim or elsewhere in the '793 patent to support such a stringent requirement. Indeed, as Sears argues, the purity requirement propounded by Cargill would exclude various of the examples cited in the patent, since according to the evidence – including the testimony of Dr. Nauman – the carbohydrate sources cited vary in sugar content from 50% to 99% with none being "pure".[15]

The '793 patent stresses the importance of the requirement that the carbohydrates utilized be derived from sources with "consistent physical and chemical properties", '793 patent, col. 2, lns. 28-29, and distinguishes

[15] The '793 patent and its parent application cite several examples of the kind of sources of "low molecular weight carbohydrates" available, including glucose, fructose, maltose, lactose, corn syrup DE44, corn syrup DE20, molasses, and maltodextrin.

prior art teaching de-icing agents derived from agricultural waste products with famously poor consistency. "[A] claim term will not carry its ordinary meaning if the intrinsic evidence shows that the patentee distinguished that term from prior art on the basis of a particular embodiment, expressly disclaimed subject matter, or described a particular embodiment as important to the invention." *Altiris, Inc.*, 318 F.3d at 1370 (quoting *CCS Fitness*, 288 F.3d at1366). Consistent with this approach, the six specific embodiments set forth in the '793 patent utilize refined agricultural products with just such properties as a designated low molecular weight carbohydrate source. As the Federal Circuit has noted, "the written description of the preferred embodiments 'can provide guidance as to the meaning of the claims, thereby dictating the manner in which the claims are to be construed, even if the guidance is not provided in explicit definitional format.'" *Bell Atlantic Network Servs., Inc. v. Kovad Communications Group, Inc.*, 262 F.3d 1258, 1268 (Fed. Cir. 2001) (quoting *SciMed*, 242 F.3d at 1344).

From the terms of the '793 patent, including the specified embodiments, consideration of the potential sources of low molecular weight carbohydrates listed, and the prior art referenced, I conclude that a

person of ordinary skill in the art would construe the term "low molecular weight carbohydrate", as used in the '793 patent, as a material which includes carbon, hydrogen, and oxygen where the ratio of hydrogen to oxygen is the same as in water, and which is obtained from a refined and consistent source.[16]

iv) Chloride Salt

The term "chloride salt", as utilized in the '793 patent, does not seem to be controversial. A salt is generally accepted by one of the ordinary skill in the art as a neutralization product of an acid and a base. Both parties agree that a chloride salt is one in which the anion, or negatively charged portion, is comprised of chlorine, and can include sodium chloride, magnesium chloride and calcium chloride.

v) Balance

The independent claims of the '793 patent specify ranges, in percentages by weight, for carbohydrate and chloride salt content, and

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[16] Sears' expert also proposes a requirement that the carbohydrate source have a recognized CAS registry – a numerical identifier maintained under the auspices of the American Chemical Society. The CAS registry assigns a number to each new substance registered to describe such properties and information as molecular formula, structure diagram, systemic names, generic names, proprietary or trade names for registered substances. Because there is no intrinsic evidence suggesting the additional requirement of a CAS number, I have rejected this additional suggested definitional provision.

identify water as constituting the "balance". The parties disagree over whether this term, in combination with the specification of the carbohydrate and chloride salt content range, permits inclusion of any incidental impurities or additional ingredients other than the colorants and thickeners specified in some of the claims. The battle lines regarding this term are drawn based upon the parties' respective positions concerning the permitted extent of impurities in the composition taught by the '793 patent. Cargill urges a confined, closed ended reading of the term, to the exclusion of other, non-specified ingredients, whereas Sears contends that it should be interpreted in such a fashion as to allow for some incidental, unspecified ingredients.

The term "balance", not necessarily restricted to the art of chemistry, is generally accepted to mean "the remainder or rest," Random House Webster's College Dictionary 101(2d ed. 1991), or "something left over, remainder", Merriam-Webster Collegiate Dictionary 87 (10th ed. 1995). *See* Hansen Aff. Exh. K. At first blush, these sources appear supportive of Cargill's proffered definition. Strictly construed, use of the closed-ended term "balance" in the formulation specified indicates that other than the low molecular weight carbohydrate source and chloride salts, as well

as possible addition of thickeners and colorants, the remainder of the solution practiced in the '793 patent is water only. Such a strict definition, however, ignores the realities associated with the patent, and in particular the designated sources of carbohydrates and chloride salts. Commercially available sources for the low molecular weight carbohydrates and the chloride salts, as well as the water, specified within the invention by definition all include impurities. Clearly what the term "balance" was intended to eliminate were the harmful, unlisted ingredients associated with the prior art, based on agricultural waste products which

> utilize materials which have highly undesirable or unnecessary ingredients leading to practical difficulties by manufacturers and users, such as stratification in storage, biological degradation, odor, plugging of filters and spray nozzle and environmental difficulties *e.g.* . . . high organic contents (about 40% by weight), presence of phosphorus compounds and heavy metals.

'793 patent, col. 1, ln. 66-col. 2, ln.6.

It should also be noted that the use of such closed-ended terms as balance, or "consisting essentially of" can allow for the presence of "unlisted ingredients that do not materially affect the basic and novel properties of the invention." *PPG Indus. v. Guardian Indus. Corp.*, 156 F.3d 1351, 1354 (Fed. Cir. 1998).

In light of these considerations, and the ’793 patent itself, I construe the term “balance”, as used, to mean that aside from the other specified ingredients, including low molecular carbohydrates and chloride salts, and with the possible addition of colorants and thickeners, as well as incidental impurities or harmless ingredients associated with the commercial sources of the key components in the invention, the solution shall contain only water. To hold otherwise, and specifically to adopt Cargill’s interpretation, would be to reject the reality of impurities in all of the stated ’793 ingredients.

vi) Colorant

Claims three and six of the ’793 patent provide for the inclusion of a colorant in the invention described in claims one and four, respectively, in order “to provide visual aid in applying the composition to a surface.” Once again, the parties differ concerning this term, their disagreement centering upon whether the colorant must be a separately added ingredient, and instead can be inherent in one of the other prescribed constituents.

According to one authoritative chemical dictionary, the term “colorant” is described as a “substance that imparts color to another

material or mixture. Colorants are either dyes or pigments and may be (1) naturally present in a material . . . (2) admixed with it mechanically . . . or (3) applied to it in a solution". Hawley's, at 287, as cited in Marks Claim Construction Aff. Exh. 18. As can be seen, this definition does not appear to limit the term to color additives, but instead is sufficiently broad to allow for inclusion of pigmented or dyed materials already included within the formulation.

To be sure, there is some facial appeal to Cargill's argument that use of the phrase "further includes" suggests that the addition of a separate colorant as an ingredient was envisioned by the inventors. This proffered interpretation, however, is belied by the illustrations given in the patent. As Cargill concedes, certain of the examples cited describe materials which are in some way colored in appearance without the introduction of a separate ingredient to instill color. While in examples I and II a colorant (Caramel YT25) is added, example III describes a solution, with high maltose corn syrup and industrial grade magnesium chloride solution as the key ingredients, which has an appearance described as "[c]lear, light brown" without the addition of any separate colorant.

Based upon the cited examples, the stated objective of including a colorant, and the Hawley's definition of the term, I reject the restrictive reading of the term "further" which would exclude the possibility of a colorant already inherent and present in the solution described in claims one and four. Instead, I adopt a definition of "colorant" to include a substance or material, whether inherent in or separately added to the specified composition, which imparts color to the composition.

vii) Thickener

Claims four through six and eight provide for inclusion of a thickener with the previously described solution and, unlike the case with regard to colorants, also provide weight by percentage limits for such thickeners. The parties also disagree upon the definition of this term, and specifically whether it must be a separately added ingredient, or instead can be inherent in the other materials included within the composition.

A "thickening agent" is described by one source as "any of a variety of hydrophilic substances used to increase the viscosity of liquid mixtures and solutions". Hawley's, at 1084, as cited in Marks Aff. Exh. 19. The '793 patent describes the use of thickeners envisioned by the inventors as follows:

> Thickeners are used in certain applications as the third key component to increase the viscosity of the composition so that the liquid remains in contact with the road surface or with the solid particles in piles of rocksalt/sand, or rocksalt/aggregates, or salt alone, or sand or aggregate. Thickeners are mainly cellulose derivatives or high molecular weight carbohydrates.

'793 patent, col. 2, ln. 63-col. 3, ln. 2. To be sure, inclusion of the phrase "the third key component" in the '793 patent does provide reason for pause. Nonetheless, it is generally understood – and indeed spelled out in the patent – that thickeners, whose sole function is to increase viscosity of a solution, are typically polymers, high molecular weight carbohydrates or cellulose derivatives, including carbohydrates. Reviewing the patent as a whole and the other intrinsic evidence available, I am unable to conclude that a person of ordinary skill in the art would not understand, in the context of this patent, that the thickeners envisioned could be included within the other prescribed constituents. Accordingly, I will construe the term "thickener" to mean a substance or material, whether inherent in or separately added to a composition, which causes an increase in the composition's viscosity.

B. Summary Judgment Standard

In addition to eliciting the court's assistance in connection with claim

construction, the parties – principally Cargill – have sought summary judgment addressing several of the claims and defenses asserted in this action.

The entry of summary judgment disposing of a claim or defense is appropriate in a patent infringement suit, provided that the test ordinarily applicable to such applications is met. *Ethicon Endo-Surgery, Inc. v. United States Surgical Corp.*, 149 F.3d 1309, 1315 (Fed. Cir. 1998). Under that test, summary judgment is warranted when "the pleadings, depositions, answers to interrogatories, and admissions on file, together with the affidavits . . . show that there is no genuine issue as to any material fact and that the moving party is entitled to a judgment as a matter of law." Fed. R. Civ. P. 56(c); *Celotex Corp. v. Catrett*, 477 U.S. 317, 322, 106 S. Ct. 2548, 2552 (1986); *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 247, 106 S. Ct. 2505, 2509-10 (1986). The moving party has the initial burden of demonstrating that there is no genuine issue of material fact to be decided with respect to any essential element of the nonmoving party's claim. *Anderson*, 477 U.S. at 250 n.4, 106 S. Ct. at 2511 n. 4. Once that burden is met, the opposing party must show, through affidavits or otherwise, that there is a material factual issue for

trial.[17] Fed. R. Civ. P. 56(e); *Celotex*, 477 U.S. at 324, 106 S. Ct. at 2553; *Anderson*, 477 U.S. at 250, 106 S. Ct. at 2511. When deciding a summary judgment motion, the court must resolve any ambiguities and draw all inferences from the facts in a light most favorable to the nonmoving party. *Wright v. Coughlin*, 132 F.3d 133, 137-38 (2d Cir. 1998). Summary judgment is inappropriate where "review of the record reveals sufficient evidence for a rational trier of fact to find in the [non-movant's] favor." *Treglia v. Town of Manlius*, 313 F.3d 713, 719 (2d Cir. 2002) (citation omitted).

As will be seen, the claims and defenses drawn into issue by the pending cross-motions are subject to differing burden of proof allocations as between the parties as well as, in certain instances, a heightened burden beyond mere preponderance of the evidence. When assessing a motion for summary judgment the court should take into consideration the question of who bears the burden of proof, as well as the extent of that burden. *Anderson*, 477 U.S. at 252-55, 106 S. Ct. at 2512-14.

C. <u>Patent Invalidity</u>

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[17] A material fact is genuinely in dispute "if the evidence is such that a reasonable jury could return a verdict for the nonmoving party." *Anderson*, 477 U.S. at 248, 106 S. Ct. at 2510.

In its motion Cargill seeks a finding, as a matter of law, that the '793 patent is invalid. In support of its position plaintiff urges 35 U.S.C. § 102(b), contending that the claimed invention was the subject of both sales and printed publications describing the invention and dating back more than one year prior to the filing date of the patent application. Cargill's invalidity argument hinges upon its claim that the date of application for the '793 patent should be affixed as January 5, 2001, and that Sears should not derive the benefit of either of its two earlier applications when determining the appropriate priority date to be applied.

Analysis of the validity of the '793 patent must proceed against the backdrop of the independent presumption of validity which by statute attaches to each claim contained within a regularly issued patent under 35 U.S.C. § 282.[18] *Continental Can Co. USA, Inc. v. Monsanto Co.*, 948 F.2d 1264, 1266-67 (Fed. Cir. 1991) (citing 35 U.S.C. § 282 and *Altoona Publix*

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18 The statute giving rise to this presumption provides that

> [a] patent shall be presumed valid. Each claim of a patent (whether in independent, dependent, or multiple dependent form) shall be presumed valid independently of the validity of other claims; dependent or multiple dependent claims shall be presumed valid even though dependent upon an invalid claim. . . . The burden of establishing invalidity of a patent or any claim thereof shall rest on the party asserting such invalidity.

35 U.S.C. § 282.

Theatres, Inc. v. American Tri-Ergon Corp., 294 U.S. 477, 487, 55 S. Ct. 455, 459 (1935)); *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1534 (Fed. Cir. 1983) (under section 282 a "party asserting invalidity not only has the procedural burden of proceeding first and establishing a *prima-facie* case, but the burden of persuasion on the merits remains with that party until final decision."); *see also Conmed Corp. v. Erbe Electromedizin GMBH,* 241 F. Supp. 2d 187, 192 (N.D.N.Y. 2003) (Hurd, J.), *vacated due to settlement*, No. 00-CV-987, 2004 WL 1576596 (N.D.N.Y. June 29, 2004). A party seeking to overcome this presumption and establish patent invalidity must do so by clear and convincing evidence. *Rosco, Inc. v. Mirror Lite Co.,* 304 F.3d 1373, 1377 (Fed. Cir. 2002); *Pfizer, Inc. v. Perrigo Co.*, 933 F. Supp. 377, 379 (S.D.N.Y. 1996) (citing, *inter alia*, *Ralston Purina Co. v. Far-Mar-Co., Inc.*, 772 F.2d 1570, 1573 (Fed. Cir. 1985)).

Under 35 U.S.C. § 102, any sale, offer for sale, or public use of a product within the scope of the claimed invention more than one year prior to the date of application for the patent renders a patent invalid as anticipated. *Petrolite Corp. v. Baker Hughes Inc.*, 96 F.3d 1423, 1425 (Fed. Cir. 1996). A patent is also invalid as anticipated if any patent or

printed publication has described the invention outside of that same one year period. *C.R. Bard, Inc. v. M3 Sys., Inc.*, 157 F.3d 1340, 1349 (Fed. Cir. 1998).

Anticipation as a defense to a patent infringement claim must be proven by "clear and convincing evidence". *Ralston Purina*, 772 F.2d at 1573-74. Ordinarily, the defense of anticipation presents questions of fact, including whether or not an element of a patent claim is inherent in the prior art. *Atlas Powder Co. v. IRECO Inc.*, 190 F.3d 1342, 1346 (Fed. Cir. 1999) (citation omitted).

When addressing a claim of anticipation, a court must first define the claims of the patent, and then compare the properly construed claims to the prior art. *In re Cruciferous Sprout Litigation*, 301 F.3d 1343, 1346 (Fed. Cir. 2002). "To anticipate a claim, a prior art reference must disclose every limitation of the claimed invention, either explicitly or inherently." *Atlas Powder Co.*, 190 F.3d at 1346 (internal quotations and citation omitted). Anticipation of a patent claim requires a finding that the claim at issue "reads on" a prior art reference – in other words, if granting patent protection would permit the patentee to exclude the public from practicing the prior art, the claim is anticipated, regardless of whether it

also covers subject matter not in the prior art. *Id.*

When a patent claims a chemical composition in terms of ranges of elements, any single prior art reference that falls within each of the ranges anticipates the claim. *Atlas Powder Co.*, 190 F.3d at 1347. A prior art reference may also anticipate when the claim limitation or limitations not expressly found in that reference are nonetheless inherent in it. *Id.*

Under the doctrine of inherency, if the prior art necessarily functions in accordance with, or includes, the claimed limitations, it anticipates. *Atlas Powder Co.*, 190 F.3d at 1347. Inherency is not necessarily coterminous with the knowledge of those of ordinary skill in the art; artisans of ordinary skill may not recognize the inherent characteristics or functioning of the prior art. *Id.* Discovery of a previously unappreciated property of a prior art composition, or of a scientific explanation for the prior art's functioning, does not render the old composition patentably new to the discoverer. *Id.*; *see also Titanium Metals Corp. of Am. v. Banner*, 778 F.2d 775, 782 (Fed. Cir. 1985). In *Atlas Powder Co.*, the Federal Circuit noted that "[t]he public remains free to make, use, or sell prior art compositions or processes, regardless of whether or not they understand their complete makeup or the underlying scientific principles which allow

them to operate." 190 F.3d at 1348. Moreover, as the Federal Circuit has noted,

> [t]o serve as an anticipation when the reference is silent about the asserted inherent characteristic, such gap in the reference may be filled with recourse to extrinsic evidence. Such evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill.

Continental Can Co., 948 F.2d at1268.

In support of its anticipation argument, Cargill urges several pieces of prior art and publications, including 1) Ice Ban, a product that has been sold since at least 1994; 2) Caliber M1000, an anti-icing and de-icing material consisting of a low molecular weight carbohydrate and solution of magnesium chloride on sale as of August 27, 1999 with a first bulk sale of October of 1999;[19] 3) the Janke '812 patent, issued in January of 1998; 4) the Johnson patent, issued in July of 1999; and 5) the Janke '135 patent, issued in August of 1999.

The first step in evaluating Cargill's invalidity claim is to determine

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[19] Sears has apparently also commenced a patent infringement suit stemming from the sale of the Caliber product line. Sears clarifies that this suit is based on a 2000 formulation of Caliber. Apparently, it was viewed by Sears as a very close call whether the 1999 formulation of Caliber fit within the '793 claims range. Since introduction of the initial formulation the makers of Caliber have increased its carbohydrate content, and Sears now believes that the product falls squarely within the '793 patent.

the proper priority date to assign to the '793 patent. Cargill asserts that the '793 patent application date of January 5, 2001 is the appropriate priority date, arguing that Sears is not entitled to the benefit of the two earlier parent and grandparent applications. Sears counters by contending that, at the very least, it is entitled to a priority date of January 4, 1999 – the date of its non-provisional parent application.

A patent application will be deemed to relate back to and receive the benefit of the filing of a parent application when

> (1) the applications are submitted by the same inventor or inventors;
>
> (2) the applications were co-pending, meaning that the second application was filed while the first application was still pending;
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> (3) the later application contains a specific reference to the prior application; and
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> (4) the prior application disclosed the invention in the manner required by 35 U.S.C. § 112.

Pfizer, 933 F. Supp. at 380 (citing 35 U.S.C. § 120 and 3 Ernest B. Lipscomb III, Walker on Patents § 9:10 28 (1985)). The first three of these conditions do not appear to be controversial; Cargill seemingly acknowledges that each is satisfied by the '793 patent application when considered together with its predecessor applications. Cargill contests,

however, Sears' ability to satisfy the fourth element of this governing test – the written description requirement.

Speaking to the written description requirement, the relevant statutory provision requires that

> [t]he specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise and exact terms as to enable any person skilled in the art to which it pertains, or with which it is mostly nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.
>
> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

35 U.S.C. § 112. Pertinently,

> [a] claim in a CIP [continuation-in-part] application is entitled to the filing date of the parent application which the claimed invention is described in the parent specification in a manner that satisfies, inter alia, the description requirement of 35 U.S.C. § 112.

Therma-Tru Corp. v. Peachtree Doors, Inc., 44 F.3d 988, 992 (Fed. Cir. 1995). Put another way, an application complies with section 120 and acquires an earlier filing date "if, and only if," it could have been added to

an earlier application without interjecting new matter. *Studiengesellschaft Kohle, M.B.H. v. Shell Oil Co.*, 112 F.3d 1561, 1564 (Fed. Cir. 1997). "Each application in the chain must describe the claimed features." *Lockwood v. American Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed Cir. 1997). The test for determining compliance with the written description requirement is whether the disclosure of the application as originally filed "'reasonably conveys to the artisan that the inventor had possession at that time of the later claimed subject matter[,]'" rather than the presence or absence of literal support in the specification for the claim language. *Ralston Purina*, 772 F.2d at 1575 (quoting *In re Kaslow*, 707 F.2d 1366, 1375 (Fed. Cir. 1983)). While the section 102(b) bar to patentability and its applicability to a particular case presents a question of law to be determined by the court, compliance with the written description requirement of section 112 presents an issue of fact to be decided based upon the particulars of each case. *Pfizer,* 933 F. Supp. at 380-81 (citing *Eiselstein v. Frank,* 52 F.3d 1035, 1038 (Fed. Cir. 1995)); *MSM Investments Co., LLC v. Carolwood Corp.*, 70 F.Supp.2d 1044, 1055 (N.D. Cal. 1999) (citations omitted), *aff'd*, 259 F.3d 1335 (Fed. Cir. 2001).

Having reviewed the record and considered the arguments of the

parties, I am unable to affix an appropriate priority date for the '793 patent as a matter of law. Sears claims the benefit of at least January 4, 1999 – the date of the filing of utility patent application no. 09/224,906, as a priority date. Such a date would defeat most of Cargill's prior art claims. Sears' argument in this regard is supported by an analysis offered by its expert, Professor Nauman, explaining that the 1999 parent application disclosed "sugars (hexoses, saccharides)" to be used in combination with chloride salts for the purpose of freezing point depression. Hansen Aff. Exh. DD, at 27-28. According to Dr. Nauman, at the time of the invention a person of ordinary skill in the art would have understood sugars to be carbohydrates with molecular weights ranging from 180 (hexoses) to about 1476 (oligosaccharides). Professor Nauman further notes that the parent application discloses a carbohydrate range (3-60%) identical to, and a chloride salt range (5-30%) nearly the same as, those of the '793 patent. Additionally, Professor Nauman observes that two of the examples in Table 4 of the 1999 application disclose mixtures of magnesium chloride and low molecular weight carbohydrate sources

(molasses and maltodextrin no. 15) within the limits of the '793 patent.[20,21]

It is true that the inventors transitioned from reference to "sugars" to "low molecular weight carbohydrates" between the January 4, 1999 application and the later application upon which the '793 patent was granted. The precise terminology utilized in a parent and CIP application need not, however, be verbatim; rather, "there may be some variation in the scope of the claimed subject matter" which will not affect the priority date of the earlier application provided that the "claims in the CIP application are substantially based upon disclosures contained in the parent application." *ConMed Corp.*, 241 F.Supp.2d at 193.

It is true, as Cargill argues, that the essence of plaintiff's patent – the synergistic interplay between the low molecular weight carbohydrates and the chloride salts contained in the mixture taught by the '793 patent – was not "discovered" by Sears until December of 1998, and thus by definition could not have been disclosed in the earlier iteration filed in January of 1998. *Chiron Corp. v. Genentech, Inc.*, 363 F.3d 1247, 1254-

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[20] Cargill's expert, Dr. Nixon, did not offer opinions on the question of anticipation and priority date.

[21] Testimony of an expert witness can constitute "substantial evidence" on issues of patent validity. *See Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1333-34 (Fed. Cir. 2002); *GNB Battery-techs v. Exide Corp.*, 38 U.S.P.Q.2d 1506, 1508 (Fed. Cir. 1996).

55 (Fed. Cir. 2004) ("the Chiron scientists, by definition, could not have possession of, and disclose, the subject matter of chimeric antibodies that did not even exist at the time of the 1984 application. Thus, axiomatically, Chiron cannot satisfy the written description requirement for the new matter appearing in the 561 patent, namely chimeric antibodies.") Nonetheless, I cannot rule out the possibility that a reasonable factfinder could conclude that the prior two applications – and particularly the second, filed in January of 1999 – adequately disclosed the later inventions such as to entitle Sears to the benefit of the earlier filing dates.

Having determined that a reasonable factfinder could conclude that the '793 patent is entitled to a priority date extending back at least until January 4, 1999, and potentially to the date of the earlier, provisional parent application on January 7, 1998, I now turn to Cargill's claim of anticipation based upon the specific prior art urged in support of that argument. Before discussing the specific prior art, it is worth reiterating that as the party challenging the validity of a presumptively valid patent, Cargill bears the burden of proof, a burden which in this case requires it to establish the existence of an on-sale bar by clear and convincing evidence. *Abbott Labs. v. Geneva Pharms., Inc.*, 182 F.3d 1315, 1318

(Fed. Cir. 1999). As the Federal Circuit noted in *Abbott Labs.*, however,

> [i]t is well settled in the law that there is no requirement that a sales offer specifically identify all the characteristics of an invention offered for sale or that the parties recognize the significance of all of these characteristics at the time of the offer. If a product that is offered for sale inherently possesses each of the limitations of the claims, then the invention is on sale, whether or not the parties to the transaction recognize that the product possesses the claimed characteristics.

Id. at 1319 (internal citations omitted).

1. Ice Ban

According to Cargill, Ice Ban has been sold since 1994, and Sears has been distributing that product since 1997. Cargill urges anticipation of independent claims one, two, and seven of the '793 patent based upon the Ice Ban sales in the one year prior to the applicable priority date.

According to Sears, reference to Ice Ban as providing an on-sale bar suffers from the same infirmities as several other instances of prior art, many of which were considered and rejected by the PTO as impediments to the issuance of the '793 patent. In support of its position, Sears notes that BCS are among the principal ingredients in Ice Ban.

It is true, as co-inventor David Wood admitted during his deposition, that the agricultural by-products used to make Ice Ban can be rich in carbohydrates of the type required by the '793 patent. Both Wood and co-

inventor Hartley have acknowledged that the active ingredients in the prior art by-products are in fact carbohydrates. As Professor Nauman has noted, however, use of BCS and other similar fermentation wastes, such as corn steep water, in a de-icer formulation does not anticipate the claims of the '793 patent since prior art utilizing in these types of waste products, including the Johnson, Janke, and Rudnick patents, was considered by the PTO examiner during the course of the '793 patent prosecution.

The record reflects that the Ice Ban products now urged by Cargill were disclosed in the Janke and Johnson patents which, in turn, were considered by the PTO examiner prior to the issuance of the '793 patent. In light of this fact and the expert report of Dr. Nauman, a reasonable factfinder could conclude that the sale of Ice Ban more than one year prior to the appropriate priority date for the '793 patent does not render the patent invalid.

2. Caliber M1000

Caliber is an anti-icing and de-icing material that contains a low molecular weight carbohydrate and a solution of magnesium chloride. Caliber was on sale as of August 27, 1999, and a bulk sale of Caliber

M1000 was made in October of 1999. Cargill claims that Caliber's ingredients fall within the ranges of the '793 patent, offering co-inventor Wood's admission during his deposition that Sears views Caliber as the same product that is disclosed in the '793 patent as support for its position.[22] In response to Cargill's arguments surrounding the Caliber M1000 product, Sears has countered that both elements of the '793 patent claims, requiring a carbohydrate and a chloride salt, are not met since according to one authoritative source, Caliber's Steve Bytnar, Caliber has never included magnesium chloride as a component. Moreover, Sears asserts, Bytnar characterizes the early sales of the product as mere "field trials."

In light of my finding of genuine issues of material fact regarding the appropriate priority date to apply, it is unnecessary to address the parties' competing contentions regarding the effect of the Caliber M1000 development and sale. If Sears is found to be entitled to the earlier priority date of January 4, 1999, based upon the filing of the nonprovisional parent application, then the development and sale of the

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[22] Co-inventor Hartley has also admitted that the Caliber product falls within the carbohydrate ranges in the '793 patent.

competing product Caliber does not invalidate the ’793 patent.

3. The Janke ’812 Patent

The Janke patent discloses a de-icing material made from whey, water, and sodium chloride. Cargill submits that typical whey powder is generally between 70 and 75% lactose, a low molecular weight sugar identified in the ’793 patent. Janke’s carbohydrate content thereby falls within the ’793 range.

Sears’ response with respect to this and the other three patents which Cargill claims anticipate the ’793 patent is the same. “[F]or purposes of determining issues of invalidity, this court must adopt the same construction of the . . . patent’s claims as it adopted in deciding the infringement issue.” *AstraZeneca AB v. Mutual Pharm. Co.*, 278 F.Supp.2d 491, 516 (E.D. Pa. 2003). Sears argues that none of the patents cited as prior art contain low molecular weight carbohydrates derived from a “pure and consistent source”, as Cargill requires in its *Markman* brief, nor from a “refined and consistent source”, the definition which Sears has proposed. Instead, those prior patents disclose de-icing inventions containing the kind of agricultural waste products expressly disclaimed by Sears. In Janke ’812, those products are the “liquids that

remain after the coagulated cheese has been removed from the milks". Hansen Aff. Exh. BB.

Sears also asserts that PTO Examiner Greene considered the Janke '812 patent during the prosecution of the '793 patent, and seeks to distinguish it from the '793 invention as not disclosing the amounts of carbohydrates and salts, or of any synergy between the two. Sears further notes that Janke does not teach the use of colorants or thickeners. Cargill responds that discovering synergy is discovering a new characteristic of an existing invention, which does not preclude a finding of anticipation.[23] *Atlas Powder Co.*, 190 F.3d at 1348-49.

Based upon the record I am unable to conclude, as a matter of law, that claims one, two, and seven of the '793 patent were anticipated by the Janke '812 patent, particularly in light of the disclosure of that patent as prior art in the '793 patent application and the granting of that patent notwithstanding that cited prior art.

4. <u>The Johnson Patent</u>

Cargill also contends that the independent claims of the '793 patent

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[23] Cargill questions whether Hartley and Wood are even entitled to credit for this discovery, since an open letter to "Friends of Ice Ban America" from Ice Ban referred to the "synergistic effects" of Ice Ban mixed with chloride salts as early as 1997. Young Aff. Exh. 5.

were anticipated by the Johnson patent, issued in July of 1999. Because this argument depends upon a finding that Sears is not entitled to a January 4, 1999 priority date, the unresolved fact questions surrounding that determination preclude the entry of summary judgment on this contention.

5. The Janke '135 Patent

Cargill also offers the Janke '135 patent, issued in August of 1999, in support of its anticipation claim. That patent, which unlike Janke '812 was not cited during the patent prosecution in this case, describes a de-icing and anti-icing composition containing at least 10% by weight of vintners' condensed solubles ("VCS"). Cargill argues that VCS contains 3.6% by weight of unfermented sugars which, in turn, consist essentially of carbohydrates based on glucose and fructose and falls within the ranges of the '793 patent.

As was true of the Johnson patent, in order to invalidate the '793 patent, the Janke '135 patent would have had to issue more than one year prior to the priority date attributable to the '793 patent. Based upon the unresolved fact question concerning the priority date, and specifically whether Sears is entitled to a priority date of January 4, 1999, summary

judgment on the question of invalidity, based upon this patent, is also inappropriate.

6. The Daly Patent

The last matter offered by Cargill in support of its anticipation argument is the Daly patent, No. 5,639,319, issued in June of 1997. That patent involves a wheel tire ballast substance comprised of molasses and up to about 50% by weight of calcium chloride or magnesium chloride. Cargill offers the Daly patent as a basis for finding anticipation in the unlikely event that in construing the '793 patent I do not find that the "de-icing and anti-icing composition" preamble of the independent claims represents a limitation on all of the patent's claims. Since this is one of the few points in the *Markman* analysis on which the parties are in agreement – that each claim should be limited to a de-icing and anti-icing composition – this patent clearly does not provide any basis for Cargill's anticipation argument.[24]

In sum, largely though not exclusively because of the unresolved fact issue regarding the priority date to attribute to the '793 patent, I deny

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[24] Even were this patent found to be relevant to the question of anticipation, the same fact issues discussed with respect to the other agricultural waste-based patents would exist with respect to this patent.

Cargill's motion for summary judgment on the issue of patent invalidity. *E-Z Bowz, L.L. C. v. Professional Prod. Res. Co., Inc.*, No. 00 Civ. 8670, 2003 WL 22068573, at *17 (S.D.N.Y. Sept. 5, 2003).

D. Patent Unenforceability

Among the relief sought by Cargill in this action is a declaration that the '793 patent is unenforceable as a result of inequitable conduct by the inventors. The claimed inequitable conduct falls into two distinct categories, including 1) alleged failure on the part of the inventors to fully disclose the material prior art known to them at the time their patent application was made and remained pending, and 2) the failure to list Bodycote as one of the inventors. The parties have cross-moved, each seeking the entry of summary judgment with respect to this inequitable conduct claim.

As a preliminary matter, it is worthy of note that claims of inequitable conduct in connection with the prosecution of a patent are by no means foreign to patent infringement litigation. The inequitable conduct defense has seemingly "attached to every patent prosecution, diverting the court from genuine issues and simply spawning satellite litigation." *Multiform Desiccants, Inc. v. Medzam Ltd.*, 133 F.3d 1473, 1482 (Fed. Cir. 1998).

Indeed, the frequency with which the defense is raised in response to infringement litigation has led the Federal Circuit to observe that "[t]he habit of charging inequitable conduct in almost every major patent case has become an absolute plague." *Burlington Indus., Inc. v. Dayco Corp.*, 849 F.2d 1418, 1422 (Fed. Cir. 1988).

Unlike many of the other defenses raised by Cargill to Sears' claims of infringement, the defense of inequitable conduct is "entirely equitable in nature, and thus not an issue for a jury to decide." *PerSeptive BioSystems, Inc. v. Pharmacia Biotech, Inc.*, 225 F.3d 1315, 1318 (Fed. Cir. 2000). In order to render an otherwise properly issued patent unenforceable on the basis of inequitable conduct, a court must be satisfied by clear and convincing evidence that such inequitable conduct has occurred. *Seiko Epson Corp. v. Nu-Kote Int'l*, 190 F.3d 1360, 1367 (Fed. Cir. 1999). Moreover, as was previously noted the defense is purely equitable; since intent and materiality generally implicate issues of fact which must be resolved before the court may rule on the defense, however, the issue is not ordinarily amenable to resolution on motion for summary judgment. *Paragon Podiatry Lab., Inc. v. KLM Labs., Inc.*, 984 F.2d 1182, 1190 (Fed. Cir. 1993).

The requirement of disclosure implicated by Cargill's inequitable conduct claims finds its roots in 37 C.F.R. § 1.56, which imposes a "duty of candor and good faith in dealing with the "[Patent and Trademark] Office" on "[e]ach individual associated with the filing and prosecution of a patent application[.]"[25] 37 C.F.R. § 1.56(a). The obligation imposed under that section "includes a duty to disclose to the Office all information known to that individual to be material to patentability[.]"[26] 37 C.F.R. § 1.56(a).

When analyzing a claim of inequitable conduct, a court must engage in a two-step analysis. The trial court must first determine whether the withheld reference meets a threshold level of materiality, and additionally whether the evidence presented establishes a threshold level of intent to mislead the PTO. *See Molins PLC v. Textron, Inc.*, 48 F.3d 1172, 1178

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[25] The term "individuals associated with the filing or prosecution of a patent application" is defined by section 1.56 to include

> (1) Each inventor named in the application;
> (2) Each attorney or agent who prepares or prosecutes the application; and
> (3) Every other person who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.

37 C.F.R. § 1.56(c).

[26] Information constituting "prior art" subject to disclosure includes both patents and printed publications. 35 U.S.C. § 102.

(Fed. Cir. 1995). If satisfied that the evidence meets or exceeds these threshold levels of intent to mislead and materiality, the court must then weigh the materiality and intent. *Id.*; *see also ConMed,* 241 F. Supp.2d at 194.

When assessing these factors, the court must consider that the more material the omission or misrepresentation, the lower the level of intent that is required; conversely, when persuasive evidence of an intent to deceive is offered, a diminished showing of materiality is required in order to establish inequitable conduct. *Critikon, Inc. v. Becton Dickinson Vascular Access, Inc.*, 120 F.3d 1253, 1256 (Fed. Cir. 1997) (citation omitted); *ConMed*, 241 F.Supp.2d at 194.

"[I]nformation is material to patentability when it is not cumulative to information already of record or being made of record in the application, and (1) establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or (2) refutes, or is inconsistent with, a position the applicant takes[.]"[27,28] 37 C.F.R. § 1.56(b).

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[27] The governing regulations provide that

> [a] prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the

"[N]o patent will be granted on an application in connection with which . . . the duty of disclosure was violated through bad faith or intentional misconduct." 37 C.F.R. § 1.56(a).

The threshold inquiry of materiality requires a detailed factual analysis of the relevance of the teachings of the reference in question, both with respect to the claims at issue and in connection with prior art which was before the examiner. *Dayco Prods., Inc. v. Total Containment, Inc.*, 329 F.3d 1358, 1367 (Fed. Cir. 2003). There is no obligation to disclose an otherwise material reference if it is cumulative or less material

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> specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

37 C.F.R. § 1.56(b).

[28] In their submissions the parties disagree as to the standard to be applied in addressing the question of materiality. As Sears points out, throughout its submissions Cargill refers to a "reasonable examiner" standard cited in many Federal Circuit opinions, including *PerSeptive Biosystems, Inc. v. Pharmacia Biotech, Inc.*, 225 F.3d 1315, 1321-22 (Fed. Cir. 2000), when addressing the question of materiality. Application of this test would require a court to determine whether there is a "substantial likelihood that a reasonable examiner would have considered [the disputed information] important in deciding whether to allow the application to issue as a patent." *Id.* at 1321. In response to considerable confusion within the courts concerning the application of this standard and the myriad others that preceded it, however, the PTO has adopted the current version of 37 C.F.R. § 1.56 in 1992. *See* 56 FR 37321. In *PerSeptive*, the Federal Circuit acknowledged this change but applied the older rule in that case since it had been in effect when the patents at issue were prosecuted. 225 F.3d at 1322 n.2. Since the '793 patent was prosecuted well after the advent of the current standard, I have applied the test enunciated in 37 C.F.R. § 1.56.

than those already before the examiner. *Halliburton Co. v. Schlumberger Tech. Corp.*, 925 F.2d 1435, 1440 (Fed. Cir. 1991). When determining whether uncited prior art is more material than that before the examiner, courts should consider the degree of similarity and differences between the prior art and the claims involved; in making this determination a court must also consider portions of the prior art references which teach away from the claimed invention. *Id.* at 1441.

When examining intent to deceive, the court must weigh all evidence, including evidence of good faith. *GFI, Inc. v. Franklin Corp.*, 265 F.3d 1268, 1274 (Fed. Cir. 2001). "Close cases should be resolved by disclosure, not unilaterally by the applicant." *LaBounty Mfg., Inc. v. U.S. Internat'l Trade Comm'n*, 958 F.2d 1066, 1076 (Fed. Cir. 1992). Intent may be inferred where the applicant knew or should have known that withheld information would be material to the PTO's consideration. *Critikon, Inc.*, 120 F.3d at 1256.

In assessing intent a court must also be cognizant of the fact that intent to deceive is rarely suggested by direct evidence. *GFI, Inc.*, 265 F.3d at 1274 (citation omitted); *Elk Corp. of Dallas v. GAF Bldg. Materials Corp.*, 168 F.3d 28, 32 (Fed. Cir. 1999). "Intent is . . . most often proven

by a showing of acts, the natural consequences which are presumably intended by the actor." *Molins PLC*, 48 F.3d at 1180. In the absence of direct evidence, intent to deceive can be inferred from facts and circumstances. *Id.* at 1180-81.

1. Failure To Disclose Prior Art

In support of its argument that the '793 inventors engaged in inequitable conduct by not disclosing material information, Cargill cites five examples, including three patents, not referenced directly during the '793 patent prosecution;[29] an article authored by Sebree, Chung and Seib, discussing the presence of low molecular weight sugars in BCS and known to inventors Wood and Hartley in 1999; an article by Hull, Peter, Cox and Montgomery, addressing the chemical composition of corn steep water; the existence of Caliber M1000; knowledge of Ice Ban and Ice Ban Magic products; and other industry literature highlighted by Bodycote regarding the freezing point depressive effects of sugars and corn syrups,

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[29] In this portion of its argument Cargill refers to U.S. Patent Nos. 4,746,449 (the "Peel patent"), 4,668,416 (the "Neal patent"), and 4,824,588 (the "Lin patent"). According to Cargill, each of those patents discloses a de-icing and anti-icing composition utilizing an agricultural waste by-product containing low molecular weight carbohydrate sugars, with the Peel patent teaching the use of pulp mill black liquour as a component of the de-icing formulation specified, and the Neal and Lin patents both addressing the role of spent sulfite liquour and lignosulphate in de-icers.

and including Highway Innovative Technology Evaluation Center ("HITEC") reports discussing the Ice Ban composition. Cargill maintains that the '793 inventors were aware of the existence of these highly relevant documents, but withheld them from the PTO office. Sears counters by maintaining that the cited references are merely cumulative and are not material, and further that in any event there has been no showing of any intent by the inventors to deceive the PTO.[30]

Having reviewed the cited references offered in support of Cargill's claim of inequitable conduct, I find as a preliminary matter that they exhibit a low degree of materiality, and in most instances are largely cumulative of other materials disclosed to the patent examiner. The Peel, Neal and Lin patents, for example, all employ as their key ingredient a highly variable, ill-defined waste product lacking in the refinement and consistency of the sources specified in the '793 patent, and appear to exemplify the problems experienced with prior waste stream sources of de-icing agent ingredients which are cumulative of those cited by

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[30] The parties' cross-motions addressing this issue are not precise mirror images. Sears seeks summary judgment in its favor on the inequitable conduct claim as a whole. Cargill, by contrast, requests summary judgment on only the portion of its inequitable conduct claim grounded in the failure to disclose the cited products and references, suggesting the existence of material fact questions relating to the portion of its argument based upon non-disclosure of the Peel, Neal and Lin patents.

inventors Wood and Hartley. Similarly, the Hull and Sebree articles merely confirm that components disclosed in prior art, including corn steep and BCS, contain low molecular weight carbohydrates – a fact specifically disclosed in the '793 patent. The cited authoritative sources reflecting the depressant effect of low molecular weight sugars are also immaterial, in that the gist of the '793 patent is not that low molecular weight carbohydrates have a depressive effect on freezing points – a matter well-known to those of ordinary skill in the art – but instead that a combination of such a carbohydrate with a salt generates a synergistic effect, something not well-known in the industry.

For similar reasons, Ice Ban, which utilizes BCS and corn steep, use of both of which in de-icing products was disclosed repeatedly during the prosecution of the '793 patent, would merely have been cumulative to the prior disclosures. Finally, with respect to Caliber, it is noted that the inventor of the patent underlying that product, Steve Bytnar, admitted that his invention did not come into being until late June 1999, after the Sears discovery of the synergism and its filing of a non-provisional patent application with the PTO. Caliber therefore could be construed as subsequent, rather than prior, art which the '793 inventors were not

required to disclose. *See Kolmes v. World Fibers Corp.*, 107 F.3d 1534, 1538 (Fed. Cir. 1997).

In light of my finding of minimal materiality and likely cumulative effect of the cited prior art, combined with the paucity of evidence in the record of any intent to deceive, and the heavy burden which Cargill faces in attacking the patent on the basis of inequitable conduct, I decline its invitation to award summary judgment on this issue. Given the existence of disputed facts, when resolving all ambiguities and drawing all inferences against the moving party, however, I find that at this juncture Sears is not entitled to summary judgment on this issue, and will instead defer a ruling on this question.

Since any decision on the issues, including materiality, associated with the equitable conduct claim based upon non-disclosure of prior art would hinge upon many of the same factual issues required in order for the jury in this matter to decide plaintiff's invalidity claim, and to avoid the possibility of internally inconsistent results, I will follow the procedure outlined in *Herman v. William Brooks Shoe Co.,* No. 95 CIV. 1324, 1998 WL 832609, at *5 (S.D.N.Y. Dec. 1, 1998), and engage in a two-step process whereby the jury will be asked specific questions, in its advisory

capacity, regarding the materiality of the prior art at issue as well as the question of intent. In the event of a jury finding favorable to Cargill on both those issues, I will thereafter engage in the second step of the inequitable conduct analysis by weighing materiality and intent to deceive.

2. Inventorship

The second prong of Cargill's inequitable conduct defense is based upon its contention that Bodycote should have been identified as one of the inventors of the de-icing composition discovered. Sears now moves for summary judgment dismissing this portion of the affirmative defense to its infringement counterclaims.

Cargill's inventorship argument implicates 35 U.S.C. § 116, which provides, with respect to joint inventors, that

> [w]hen an invention is made by two or more persons jointly, they shall apply for patent jointly and each make the required oath . . . Inventors may apply for a patent jointly even though (1) they did not physically work together or at the same time, (2) each did not make the same type or amount of contribution, or (3) each did not make a contribution to the subject matter of every claim of the patent.

35 U.S.C. § 116. Section 103(a), however, provides that "[p]atentability shall not be negatived by the manner in which the invention was made."

35 U.S.C. § 103(a). Instead, under section 256

> [W]henever through error a person is named in an issued patent as the inventor, or through error an inventor is not named in an issued patent and such error arose without any deceptive intention on his part, the Director may, on application of all the parties and assignees, with proof of the facts and such other requirements as may be imposed, issue a certificate correcting such error.
>
> The error of omitting inventors or naming persons who are not inventors shall not invalidate the patent in which such error occurred if it can be corrected as provided in this section. The court before which such matter is called in question may order correction of the patent on notice and hearing of all parties concerned and the Director shall issue a certificate accordingly.

35 U.S.C. § 256. "This rule is meant to allow the correction of honest mistakes. It is essentially an equitable rule which says that patents should not be invalidated for technical reasons which do not harm either the public or individual litigants, and where the moving party has obtained no fraudulent gain." *U.S. Indus., Inc. v. Norton Co.*, 184 U.S.P.Q. 187, 189 (N.D.N.Y. 1974) (Foley, J.) (citations omitted).

Since "a patent is presumed valid, there follows a presumption that the named inventors on a patent are the true and only inventors." *Trovan, Ltd. v. Sokymat SA, Irori*, 299 F.3d 1292, 1301 (Fed. Cir. 2002) (internal

citations omitted). Consequently, to overcome this presumption of validity misjoinder or nonjoinder of inventors must be proven by clear and convincing evidence. *Hess v. Advanced Cardiovascular Sys., Inc.*, 106 F.3d 976, 979-80 (Fed. Cir.) (citation omitted), *cert. denied*, 520 U.S. 1277, 117 S. Ct. 2459 (1997).

The Federal Circuit has defined a "joint invention" as "the product of a collaboration between two or more persons working together to solve the problem addressed." *Burroughs Wellcome Co. v. Barr Labs., Inc.*, 40 F.3d 1223, 1227 (Fed. Cir. 1994) (citing, *inter alia*, *Kimberly-Clark Corp. v. Proctor & Gamble Distrib. Co.*, 973 F.2d 911, 917 (Fed. Cir. 1992)), *cert. denied*, 516 U.S. 1070, 116 S. Ct. 771 (1996). "'The fact that each of the inventors plays a different role and that the contribution of one may not be as great as that of another does not detract from the fact that the invention is joint if each makes some original contribution, though partial, to the final solution of the problem.'" *PerSeptive Biosystems, Inc. v. Pharmacia Biotech, Inc.*, 12 F.Supp.2d 69, 84 (D. Mass. 1998) (quoting *Kimberly-Clark*, 973 F.2d at 916-17). If a person contributes to the conception of just one limitation in a patent, then that person is a joint inventor. *Trovan*, 299 F.3d at 1302.

Determining inventorship requires deciding who conceived the claimed subject matter of the patent. *See Sewall v. Walters*, 21 F.3d 411, 415 (Fed. Cir. 1994). "All that is required of a joint inventor is that he or she (1) contribute in some significant manner to the conception or reduction to practice of the invention, (2) make a contribution to the claimed invention that is not insignificant in quality, when that contribution is measured against the dimension of the full invention, and (3) do more than merely explain to the real inventors well-known concepts and/or the current state of the art." *Pannu v. Iolab Corp.*, 155 F.3d 1344, 1351 (Fed. Cir. 1998).

Conception is the "formation in the mind of the inventor, of a definite and permanent idea of the complete and operative invention, as it is hereafter to be applied in practice." *Amgen, Inc. v. Chugai Pharm. Co., Ltd.*, 927 F.2d 1200, 1206 (Fed. Cir. 1991) (citations and internal quotations omitted). "Conception requires both the idea of the invention's structure and possession of an operative method of making it." *Id.* (citation omitted). "[T]he test for conception is whether the inventor had an idea that was definite and permanent enough that one skilled in the art could understand the invention[.]" *Burroughs Wellcome*, 40 F.3d at 1228.

Moreover, an "idea is definite and permanent when the inventor has a specific, settled idea, a particular solution to the problem at hand, not just a general goal or research plan he hopes to pursue." *Id.* The Federal Circuit has also held that "[a]n inventor may solicit the assistance of others when perfecting the invention without 'losing' any patent rights." *Trovan*, 299 F.3d at 1302 (citing *Shatterproof Glass Corp. v. Libbey-Owens Ford Co.*, 758 F.2d 613, 624 (Fed. Cir. 1985)).

"Absent fraud or deceptive intent, the correction of inventorship does not affect the validity or enforceability of the patent for the period before the correction." *Viskase Corp. v. American Nat'l Can Co.*, 261 F.3d 1316, 1329 (Fed. Cir. 2001). Where the accuser has not been harmed by the allegedly improper joinder of inventors, the accuser must prove that the patentee made a "fraudulent gain" by virtue thereof. *U.S. Industries*, 184 U.S.P.Q. at 189.

Cargill contends that the invention claimed in the '793 patent was Bodycote's invention, and not that of the claimed inventors, Wood and Hartley. Cargill's expert, Dr. Nixon, opines that the exhibits from the deposition of a Bodycote representative show that the company suggested various steps to be taken and determined the formulations

which eventually resulted in the '793 patent. It was Bodycote, Cargill notes, that proposed separating Ice Ban into fractions in order to examine the freezing point depressive effect of each isolated portion of the composition.

Sears counters that Wood and Hartley operated as a unit in taking the steps leading up to discovery of the invention, with Wood having experience in the industry, and Hartley with knowledge of chemistry. Sears offers the declaration of John McNeil, Ph.D, the Operations Manager of Bodycote in charge of the Sears testing, to establish that Bodycote's role was essentially that of a laboratory for hire, with all testing having been conducted under the direction of, and fully authorized by, either Hartley and/or Wood, and that Bodycote did no independent testing without instruction – a fact which both Hartley and Wood have confirmed.[31] As Sears' expert, Dr. Nauman, has noted, it is not uncommon for inventors to enlist assistance in reducing to practice their inventions, especially when they lack the inside resources.

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[31] Although Cargill points out that it was Bodycote that offered the suggestion for the thickener in the '793 patent, suggesting that an environmentally friendly compound could be used to build viscosity, it fails to mention that the compound it proposes in that same sentence is "the cellulosic materials recommended by Bob Hartley." Marks Invalidity Aff. Exh. 29, at B01061.

In support of its position regarding the limited role played by Bodycote, Sears cites *Burroughs Wellcome*, in which the Federal Circuit held that the laboratory scientists at the National Institute of Health (NIH) were not co-inventors, because the testing performed by that agency merely confirmed the operability of the patentee's idea. 40 F.3d at 1230-31. Key to the court's determination in that case was the fact that the patentee had a draft patent application in hand before hiring the NIH. *Id.* Sears points out that in this case inventors Wood and Hartley not only had their provisional patent application in draft form, but in fact it was actually on file with the PTO, before Bodycote was engaged.

Cargill distinguishes *Burroughs Wellcome* by arguing that in this instance the critical discoveries later claimed, including the synergism between the carbohydrate and salt elements, were made by Bodycote and incorporates its argument that the invention was not originally disclosed in the earlier applications. Obviously, this is an issue that is intertwined with the ultimate issue in the case; if the actual invention was not disclosed in earlier applications, that affects the priority analysis as well as the invalidity determination. Drawing all inferences, and resolving all ambiguities, in favor of Cargill, as the non-moving party, I find that there

are genuine issues of material fact to be determined at trial with regard to the issue of Bodycote's role in conception of the invention which is the subject of the '793 patent.

The discernment of an issue of fact with regard to conception, however, does not end the inquiry. A finding of invalidity based upon failure to disclose a co-inventor also requires a showing of deceptive intent. To counter Cargill's claim of deceptive intent, Sears cites to section ten of the signed project agreement between Sears and Bodycote, which provides that

> [a]ll resulting inventions, patents thereon and applications for patents thereon shall, after completion of and payment for all the services which are to be provided under this Agreement . . . become the property of and be assigned or licensed to the Client for and to the extent of their use within the objectives of the Project[.]

Hansen Aff Exh. R, at SP 00611. During his deposition testimony, Bodycote manager John McNeill confirmed this agreement regarding allocation of intellectual priority rights.

Against this backdrop Cargill, which has had the opportunity to fully depose Bodycote, has offered no evidence of any intent on the part of inventors Wood and Hartley to deceive the PTO regarding the question of

inventorship. In the absence of such evidence, I find no issue of material fact on the question of intent to deceive, and will therefore grant Sears' motion for summary judgment dismissing this portion of Cargill's inequitable conduct defense. *See Celotex*, 477 U.S. at 324, 106 S. Ct. at 2553.

E. Non-Infringement

In its counterclaims, Sears contends that four Cargill products infringe the '793 patent, including ClearLane Liquid, ClearLane Treated Salt, ClearLane PNS Liquid, and ClearLane PNS.[32] Cargill now seeks the entry of summary judgment finding non-infringement as a matter of law.

In appropriate cases where the requisite showing has been made, a court may grant summary judgment on the issue of infringement. As the Federal Circuit has noted,

> [d]etermination of infringement, whether literal or under the doctrine of equivalents, is a question of fact. "Thus, summary judgment of non-infringement can only be granted if, after viewing the alleged facts in the light most favorable to the non-movant, there is no genuine issue whether the accused device is encompassed by the claims."

Hilgraeve Corp. v. Symantec Corp., 265 F.3d 1336, 1341 (Fed. Cir. 2001)

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[32] Sears has also claimed, but appears now to lack any evidence establishing, that ClearLane Liquid Plus infringes the '793 patent.

(quoting *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1304 (Fed. Cir. 1999)), *cert. denied*, 535 U.S. 906, 122 S. Ct. 1206 (2002).

35 U.S.C. § 271(a) prohibits making, using, offering to sell or selling the invention embodied in the '793 patent. 35 U.S.C. § 271(a). Only one of these proscribed activities need be proven in order to support a finding of infringement. *Roche Prods., Inc. v. Bolar Pharm. Co., Inc.*, 733 F.2d 858, 861 (Fed. Cir.), *cert. denied*, 469 U.S. 856, 105 S.Ct. 183 (1984).[33] Determination of infringement is a question of fact, and requires proof by a preponderance of the evidence. *Hilgraeve Corp.*, 265 F.3d at 1341 (citation omitted); *Rohm & Haas Co. v. Brotech Corp.*, 127 F.3d 1089, 1092 (Fed. Cir. 1997).

All that is required to infringe a patent is to infringe any one claim of the patent. *Bio-Technology Gen. Corp. v. Genentech, Inc.*, 80 F.3d 1553, 1562 n.8 (Fed. Cir.), *cert. denied*, 519 U.S. 911, 117 S. Ct. 274 (1996). In order to establish infringement on a specific claim, however, the claimant must show the presence of each element of that claim in the accused product. *Lemelson v. United States*, 752 F.2d 1538, 1551 (Fed. Cir. 1985).

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[33] While *Roche* was statutorily overridden on other grounds, it remains good law to the extent of supporting this general proposition.

"Where the evidence of infringement consists merely of one expert's opinion, without supporting tests or data, the district court is under no obligation to accept it." *W.L. Gore & Assocs., Inc. v. Garlock, Inc.*, 842 F.2d 1275, 1280 (Fed. Cir. 1988). By the same token, competent expert testimony can constitute "substantial evidence of infringement." *See Ultradent Prods., Inc. v. Life-Like Cosmetics, Inc.*, 127 F.3d 1065, 1070 (Fed. Cir. 1997).

With these elementary and noncontroversial principles in mind, I will turn to analysis of the record regarding each of the four accused products.

1. <u>ClearLane Liquid and ClearLane PNS Liquid</u>

ClearLane Liquid is a product used by Cargill to spray onto rock salt to form its ClearLane Treated Salt.[34] ClearLane Liquid has had two separate formulations. The original configuration, referred to as "old ClearLane", was marketed between October 4, 2000 and the Fall of 2002. The "new ClearLane", marketed from 2002 forward, contains a lower concentration of molasses. Sears has produced in the record written interrogatory responses from Cargill, internal Cargill documents, and results of testing of samples of ClearLane provided to Sears by Cargill to

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[34] Cargill has referred to the products utilized in this fashion as "pre-wetting agents."

establish the composition of Cargill's ClearLane products.

As an overarching theme, Cargill begins by noting that molasses is the only source of carbohydrates found in its accused products. Cargill challenges the contention that its molasses-based products infringe any of the claims of the '793 patent, since molasses is not a purified and consistent source of carbohydrates. In support of this contention, Cargill points to Sears' acknowledgment that molasses includes approximately twenty-five by weight of solid materials other than low molecular weight carbohydrate sugars, including inorganic materials, other carbohydrates, and additional organic materials. Cargill also contends that ClearLane Liquid is not a de-icing and anti-icing composition, in that it is designed not for direct application to a roadway or pavement surface, but instead to be applied primarily as a pre-wetting agent. Cargill further contends that ClearLane Liquid is not a truly aqueous solution, and that in any event there is no proof in the record that ClearLane Liquid has ever been made, used, or sold in the form designated in Cargill's MSDS and technical data sheets applicable to that composition. Finally Cargill insists that at least partial summary judgment with regard to ClearLane Liquid is appropriate since it does not include a colorant, as required in claim three of the '793

patent, nor does it contain a thickener or the required viscosity described in independent claims four through six and eight.

Based upon the evidence contained within the record, a reasonable factfinder could conclude that the ClearLane Liquid infringes each of the elements of one or more of the claims of the '793 patents. ClearLane Liquid is plainly susceptible of being considered a de-icing and/or anti-icing composition, as I have construed that claim. In my estimation, based upon the record, a reasonable factfinder could conclude that ClearLane Liquid comprises an aqueous solution, and that the low molecular weight carbohydrates specified in the '793 patent exist in ClearLane Liquid within the weight ranges specified in the patent's claims. Extrapolating from the molasses content of the product, a reasonable factfinder could also find that ClearLane Liquid contains low molecular weight carbohydrates within the ranges set forth in the '793 patent. Such a factfinder could also find the presence of magnesium chloride in the specified ranges when it is mixed for use in making ClearLane Treated Salt. I further find, consistent with my claim construction, that ClearLane Liquid could be found to include both the requisite colorant and thickener to fall within the dependent claims adding those elements. Finally, the fact

that ClearLane Liquid is not intended by Cargill to be applied directly to roadways is not dispositive in view of my finding that the claims of the '793 patent should not be construed so narrowly.

In addition to falling within one or more of the claims of the '793 patent, I conclude that the record adequately establishes issues of fact regarding Cargill's manufacture, use, offering for sale, or sale of ClearLane Liquid as an infringing product. The record, including Cargill's interrogatory responses, could support a finding that it did manufacture ClearLane Liquid even though, as Cargill argues, it is merely an intermediate step in the process leading to the manufacture of a final de-icing product. In any event from the record a reasonable factfinder could conclude that Cargill has used ClearLane Liquid, a potentially infringing product.

Also at issue with regard to Cargill's summary judgment motion addressing the issue of infringement is ClearLane PNS Liquid. That product is used, in conjunction with rock salt, in much the same way as ClearLane Liquid is used as a pre-wetting agent to form ClearLane Treated Salt. ClearLane PNS Liquid, according to the record, is a mixture of molasses and magnesium chloride hexahydrate, with molasses

constituting 50% of the mixture. For much the same reason as applies to ClearLane Liquid, a reasonable factfinder could conclude that ClearLane PNS Liquid does infringe one or more of the claims of the '793 patent, as I have construed them.

I therefore will deny Cargill's motion for summary judgment on the issue of noninfringement with regard to these products.

2. ClearLane Treated Salt and ClearLane PNS

Two other of the accused products in this action are Cargill's ClearLane Treated Salt and ClearLane PNS. According to the record, ClearLane Treated Salt consists of a mixture of six gallons of magnesium chloride and two gallons of molasses with one ton of rock salt. ClearLane PNS is a similar end product derived from ClearLane PNS Liquid.

Sears' argument with regard to ClearLane Treated Salt is derivative, in that it relates to the manufacture and use of the infringing liquids, including ClearLane Liquid and ClearLane PNS Liquid, used to pre-wet the rock salt. While, as indicated above, the use of ClearLane Liquid and ClearLane PNS Liquid in this fashion could potentially constitute infringement, the manufacture and sale of ClearLane Treated Salt and ClearLane PNS in and of itself does not, since, among other things, it

does not constitute an aqueous solution as I have construed the claims of the '793 patent.

Cargill is therefore entitled to summary judgment finding that the manufacture and sale of ClearLane Liquid Plus, ClearLane Treated Salt, as well as ClearLane PNS, in and of itself, and excluding the contention that the use of ClearLane Liquid and ClearLane PNS Liquid in conjunction with these products could constitute infringement, should be dismissed.

F. Willful Infringement

In their counterclaims, defendants allege willful patent infringement on the part of Cargill, and accordingly seek enhanced damages. Cargill now requests the entry of summary judgment dismissing this element of Sears' infringement claim, arguing that no reasonable factfinder could conclude that any infringement which may have occurred was willful. In support of this argument, Cargill relies virtually exclusively upon an opinion of its outside patent counsel, to the effect that the appropriate priority date for the '793 patent was January 5, 2001, in which case Cargill's '979 patent, which encompasses its ClearLane materials and was applied for on February 28, 2000, has priority.

In the patent infringement setting, the question of willfulness

presents an issue of fact which must be decided utilizing a clear and convincing evidence standard. *Comark Comms., Inc. v. Harris Corp.*, 156 F.3d 1182, 1190 (Fed. Cir. 1998) (citing *Read Corp. v. Portec, Inc.*, 970 F.2d 816, 829 (Fed. Cir. 1992)). Taking into account the enhanced burden of proof, as I must on a motion for summary judgment, *see Anderson*, 477 U.S. at 252-55, 106 S. Ct. at 2512-14, the critical inquiry at this juncture is a determination of whether a reasonable factfinder could conclude, based upon the record now before the court and resolving all ambiguities and deciding all inferences in favor of Sears, as the non-moving party, that clear and convincing evidence exists to establish that Cargill acted in disregard of the '793 patent and had no reasonable basis for believing that its actions were justified. The burden of demonstrating that no reasonable factfinder could conclude that Sears can meet its burden of establishing willfulness by clear and convincing evidence is a heavy one, notwithstanding the enhanced burden of proof which it faces at trial on this issue. *Comark Comms., Inc.*, 156 F.3d at 1190. It is against this backdrop that Cargill's request for summary judgment removing the willfulness issue from the jury's consideration must be assessed.

Willfulness may be found where it is demonstrated that the infringer

acted in disregard of a patent and had no reasonable basis for believing it had a right to act as it did. *See SRI Int'l v. Advanced Tech. Labs., Inc.*, 127 F.3d 1462, 1464-65 (Fed. Cir. 1997); *Electro Med.Sys., S.A. v. Cooper Life Scis., Inc.*, 34 F.3d 1048, 1056 (Fed. Cir. 1994). In making that assessment a jury must determine "whether, under all the circumstances, a reasonable person would prudently conduct himself with any confidence that a court might hold a patent invalid or not infringed." *Ryco, Inc. v. Ag-Bag Corp.*, 857 F.2d 1418, 1428 (Fed. Cir. 1988). In the event of a finding of willfulness the trial court may, in its discretion – although it is not required to – award enhanced damages of up to three times the compensatory damage award pursuant to 35 U.S.C. § 284. *Read*, 970 F.2d at 826.

After a party receives actual notice of another's rights to an issued patent, that party has an affirmative duty to act with due care. *Read Corp.*, 970 F.2d at 828; *Ortho Pharm Corp. v. Smith*, 959 F.2d 936, 944 (Fed. Cir. 1992); *Underwater Devices, Inc. v. Morrison-Knudsen Co., Inc.*, 717 F.2d 1380, 1389-90 (Fed. Cir. 1983). The appropriate point from which to assess willfulness is at the time the alleged infringer receives notice of the patent. *Odetics, Inc. v. Storage Tech. Corp.*, 185 F.3d 1259,

1276 (Fed. Cir. 1999); *State Indus., Inc. v. A.O. Smith Corp.*, 751 F.2d 1226, 1237 (Fed. Cir. 1985).

One way in which accused infringers typically strive to fulfill the obligation of due care is to seek and rely upon legal opinions. Legal opinions that conclude no liability – even if ultimately found to have been incorrect – can serve to insulate an infringer from a willful finding if they are 1) competent and 2) followed. *See Ortho Pharm.*, 959 F.2d at 944-45; *see also Read Corp.*, 970 F.2d at 828-29. The competency requirement applies to both the quality of the person giving the opinion and its content. *Jurgens v. CBK, Ltd.*, 80 F.3d 1566, 1572 (Fed. Cir. 1996). An opinion is competent if it is "thorough enough, as combined with other factors, to instill a belief in the infringer that a court might reasonably hold the patent is invalid, not infringed, or unenforceable." *Ortho Pharm.*, 959 F.2d at 944. An opinion can be competent regardless of whether it turns out to be contrary to the outcome of the litigation. *Graco, Inc. v. Binks Mfg. Co.*, 60 F.3d 785, 793-94 (Fed. Cir. 1995) (citing *Read* and *Ortho Pharm*). Competency must be judged objectively, based upon the opinion's tone and apparent rooting in an adequate foundation. *Read Corp.*, 970 F.2d at 830; *Ortho Pharm.*, 959 F.2d at 945.

A client's reliance on an opinion is reasonable so long as the opinion contains "sufficient internal indicia of creditability". *Underwater Devices*, 717 F.2d at1390. The most important consideration is that nothing in the letter would alert a client to reject it as "an obviously bad opinion." *Read Corp.*, 970 F.2d at 830. The client need not necessarily understand the opinion, or evaluate its legal competence, as that would defeat the purpose of obtaining legal counsel. *Id.*

"A written opinion may be incompetent on its face by reason of its containing merely conclusory statements without discussion of facts or obviously presenting only a superficial or off-the-cuff analysis." *Read Corp.*, 970 F.2d at 830 (citing *Underwater Devices*, 717 F.2d at 1390). An opinion might not suffice where an outside attorney was reluctant to give an oral opinion based on the facts before him or her, but was pressured into doing so, or where a client had previously received detailed written opinions but in that case had acted on the basis of an oral opinion. *Radio Steel & Mfg. Co. v. MTD Prods., Inc.*, 788 F.2d 1554, 1559 (Fed. Cir. 1986). "[L]egal advice is only one factor to be considered [on the question of willfulness], and an opinion of counsel does not guarantee against a finding of willfulness." *Minnesota Mining & Mfg. Co. v. Johnson &*

Johnson Orthopaedics, Inc., 976 F.2d 1559, 1580 (Fed. Cir. 1992) (citing, *inter alia*, *Ryco, Inc.*, 857 F.2d at1428). In a case where the infringer knows or has reason to believe that reliance upon the opinion of counsel is not reasonable, a finding of willfulness can result. *Minnesota Mining & Mfg. Co.*, 976 F.2d at 1580-81.

The record now before the court reveals that on October 12, 2001 – three days after its issuance – Sears' counsel wrote to Cargill accusing it of infringing the '793 patent. In response, in or about November of 2001 Cargill retained outside patent counsel, whose reputation and competency in the field Sears does not challenge, to opine concerning the claim of infringement.[35] Cargill reportedly received an oral opinion from that counsel in January of 2002, followed by a written opinion of February 1, 2002 and a more formalized, signed opinion letter dated February of 2003, and asserts that each of those oral and written opinions was consistent with the conclusion that the proper priority date attributable to the '793 patent is January 5, 2001, and that Cargill was in possession of the ClearLane product formula prior to that date. Cargill's continued

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[35] There is some uncertainty regarding the date upon which Merchant & Gould was engaged by Cargill to render an opinion. The draft opinion letter, dated February 1, 2002, recites January 25, 2002 as the date of Cargill's request that the firm conduct an analysis and provide a legal opinion regarding the matter.

development and sale of ClearLane products, in reliance upon that opinion, forms the basis for its motion for summary judgment on this issue.

While reliance upon an opinion of counsel can be a powerful, and even dispositive, factor in the willfulness inquiry, a party may not blindly rely upon a flawed or incomplete opinion of counsel in defense of a willful infringement claim, particularly if it possesses knowledge of the flaw or incompleteness. *Minnesota Mining & Mfg.*, 976 F.2d at 1580-81. It is such blind reliance which, Sears argues, should result in denial of Cargill's summary judgment motion on this issue.

As the draft opinion letter itself reflects, Merchant & Gould was asked to address only whether Sears was entitled to an earlier priority date than January 5, 2001 for its '793 patent, based upon the filings of the parent and grandparent applications, and if not whether Cargill's prior art deprives Sears of its claim of priority. Merchant & Gould was apparently not tasked with opining on the ultimate issue of infringement; indeed the firm specifically stated in its letter that it did not have available to it the "chemical compositional analysis of the specific industrial molasses that Cargill uses in its composition." Marks Willfulness Aff. Exh. 6, at C

005936. Importantly, the Merchant & Gould opinion letter relied upon provides only that "any claim interpreted to cover the Cargill ClearLane composition is *prima facie* invalid" in light of Cargill's February 28, 2000 provisional application. *Id.* at C 005950 (emphasis supplied). The letter goes on to clarify that by referring to invalidity as only "*prima facie*", the firm

> meant that, in the absence of an additional showing by Sears Petroleum, any claims of '793 found to cover ClearLane as defined would be concluded to be invalid given the conditions stated. Of course, if Sears Petroleum or Hartley et al. were able to establish that the invention claimed in '793 was in fact in their possession prior to February 28, 2000, it potentially removes the effect of the February 28, 2000, Cargill provisional filing, as prior art.

Id. The letter further disclaims any knowledge or information within Merchant & Gould's possession regarding Sears' activities prior to January 5, 2001. *Id.*

Sears maintains, and a reasonable jury could conclude, that unlike Merchant & Gould, Cargill well knew, as a result of the July and August, 1999 meetings, that inventors Hartley and Wood were in fact in possession of the invention claimed in the '793 patent prior to February 28, 2000, in which case the ground upon which the opinion rests would be

undermined. Under these circumstances I am unable to conclude that no reasonable factfinder could find willful infringement by clear and convincing evidence, notwithstanding the presence of the opinion letter offered by Cargill in defense of the willful infringement claim. I will therefore deny Cargill's motion for summary judgment on this issue. [36]

G. Dismissal of Common Law Trade Secret and Breach of Contract Claims

Among the counterclaims asserted in this case are causes of action asserted by Sears for misappropriation of trade secrets and breach of the parties' written confidentiality agreement. The essence of those claims is Sears' contention that Cargill was never genuinely interested in pursuing a business relationship with Sears, but instead encouraged and participated in a meeting in order to gain commercial intelligence regarding its new de-icing product and ultimately appropriate the information exchanged during the meetings to its own use. In support of this contention Sears cites internal Cargill documents reflecting that immediately following the meetings Cargill significantly altered its course, terminating prior

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[36] As will be seen, I find the existence of issues of fact regarding Sears' claim of Cargill's misappropriation of its trade secrets, including the formula practiced in the '793 invention. Such misappropriation, if demonstrated, could properly be considered by a jury in determining whether willful infringement has occurred. *Minnesota Mining & Mfg.*, 976 F.2d at 1581-82.

unsuccessful research programs and launching a new program to develop a de-icing product with cane molasses as its basis. According to Sears, the Cargill chemist credited with "inventing" ClearLane, Scott Koefed, acknowledged in his deposition that before the meeting with Sears he had never researched cane molasses as a de-icing product.

The record suggests that Cargill's Richard Rose – who had no formal scientific education – first asked Koefed to research the use of cane molasses a few days after the August 25, 1999 meeting with Sears. By September of that year, Cargill had begun pricing commercial cane molasses sources for use in a de-icing product, and by September 3, 1999 had commenced testing cane molasses for that purpose for the first time. Even prior to receiving the results of that testing, Rose had begun to tout to Cargill management the "synergistic effect" of molasses and sodium chloride. Hansen Aff. Exh. IIII. Cargill's ClearLane product was ultimately brought to market in October of 2000, in time for the new winter season.

Cargill now moves seeking summary judgment in its favor on Sears' common law counterclaims. In its motion Cargill has requested dismissal of Sears' common law counterclaims for misappropriation of trade secrets

and breach of contract, the latter of which is based upon the parties' confidentiality agreement executed in anticipation of the August, 1999 meeting. In support of that motion, Cargill argues that the disputed information, including the chemical composition of the formula later discussed in the '793 patent, does not qualify as trade secret information, and in any event Sears' claims are precluded by the fact that Sears voluntarily and unconditionally disclosed the reputedly confidential information to Cargill during an unrestricted meeting at which the parties had specifically promised not to exchange confidential information. Alternatively, should the common law claims survive, Cargill requests that the court make a determination at this juncture that damages are unavailable on those claims after November 21, 2000, at a time when the confidential information allegedly entered the public domain, and certainly at the time of the issuance of the '793 patent. Sears has countered by arguing law of the case, based upon this court's decision dated September 25, 2003 denying Cargill's motion to dismiss or, in the alternative, for summary judgment with regard to those claims. *See* Dkt. No. 87.

Generally speaking, law of the case tenets dictate that when a court

rules upon an issue, that decision continues to govern the same issues in subsequent stages of that case. *Pescatore v. Pan Am. World Airways, Inc.*, 97 F.3d 1, 7-8 (2d Cir. 1996); *United States v. Yonkers Bd. of Educ.*, 86 F.2d 7, 11 (2d Cir. 1988) (citations omitted). Although the doctrine is admittedly discretionary, and a court is always free to modify its own pretrial rulings at any time before it enters a final judgment, based upon jurisprudential principles underlying the law of the case doctrine – including the desire that litigants be able to rely on judicial holdings and to insure predictability of results – courts normally decline to re-examine issues previously decided in the case absent compelling circumstances, such as an intervening change of controlling law, the introduction of new evidence, or the need to correct a clear error or prevent manifest injustice. *Pescatore*, 97 F.3d at 8; *Doe v. New York City Dep't. of Soc. Servs.,* 709 F.2d 782, 789 (2d Cir.) (citations omitted), *cert. denied sub nom.*, *Catholic Home Bureau v. Doe,* 464 U.S. 864, 104 S. Ct. 195 (1983).

In this instance I need not linger in addressing the law of the case doctrine. The earlier ruling which forms the underpinning of Sears' law of the case argument was in response to a motion filed at an early procedural juncture, prior to the completion of discovery, and upon a scant

record, particularly in contrast to the exhaustive materials now before the court. Under these circumstances, the interests of justice militate against blind application of the law of the case doctrine, and I will instead re-examine the issues now raised anew, based upon the present state of the record.

The parties agree that at least insofar as the trade secret misappropriation claim is concerned, New York law should apply. *See, e.g., Hudson Hotels Corp. v. Choice Hotels Int'l*, 995 F.2d 1173, 1176 (2d Cir. 1993), *abrogated on other grounds, Nadel v. Play-by-Play Toys & Novelties, Inc.*, 208 F.3d 368, 380 n.9 (2d Cir. 2000); *Frink Am., Inc. v. Champion Rd. Mach. Ltd.*, 48 F.Supp.2d 198, 204-05 (N.D.N.Y. 1999) (McAvoy, J.). To recover under New York law for misappropriation of trade secrets, a claimant must show that it possessed a trade secret, and that it was used in breach of an agreement, confidential relationship, or duty, or as a result of discovery through improper means. *Hudson Hotels*, 995 F.2d at 1176 (citations omitted). According to the Restatement definition of trade secrets, which is followed in New York, a trade secret may consist of any formula, pattern, device or compilation of information used in one's business, and gives its owner an opportunity to obtain an

advantage over competitors who do not know or use it. *Id.* (citing Restatement of Torts § 757 comment b (1939)). Factors used in determining the existence of a trade secret include the

> 1) extent to which the information is known outside of owner's business;
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> 2) extent to which the information is known by employees and others involved in the owner's business;
>
> 3) extent of measures taken by the owner to guard the secrecy of his information;
>
> 4) value of the information to the owner and to his competitors;
>
> 5) amount of effort or money expended by the owner in developing the information; and
>
> 6) the ease or difficulty with which the information could be properly acquired or duplicated by others.

Id. at n.1 (citing Restatement § 757). Under this definition, the primary characteristic of a trade secret is the existence of a "substantial element of secrecy". *Frink Am., Inc.*, 48 F.Supp.2d at 206-07 (citing Restatement § 757 comment b); *see also Lehman v. Dow Jones & Co., Inc.*, 783 F.2d 285, 298 (2d Cir. 1986); *Kadant, Inc. v. Seeley Mach., Inc.*, 244 F.Supp.2d 19, 35-36 (N.D.N.Y. 2003) (Hurd, J.).

In its motion, Cargill asserts that the freezing point depressive effect

of low molecular weight carbohydrates and sugars was widely known within the industry prior to July of 1999. While Sears does not deny this, it notes that the invention which formed the basis of the later '793 patent is grounded in the synergistic effect of the low molecular weight carbohydrates, in a refined state, in combination with chloride salts. Cargill responds by citing industry literature making reference to the combination of low molecular weight carbohydrates and salts, including one of the HITEC reports which specifically references Ice Ban in combination with salt, yielding the product "Ice Ban Plus", as well as an open letter to "Friends of Ice Ban America", dated September 10, 1997, stating that "Ice Ban, when mixed with chloride salt solutions, show synergistic effects resulting in much lower eutectic temperatures and refreeze temperature as melting dilution occurs." Young Aff. Exh. 5, at SP04085.

Drawing all inferences and resolving all ambiguities in favor of Sears, as the nonmoving party, I am unable to conclude that no reasonable jury could find that the information disclosed by Sears to Cargill during the 1999 meetings, including the synergistic effects of combining low molecular weight carbohydrates and magnesium chloride

in enhancing freezing point depression and the fact that cane molasses and cane syrup had tested well as two potential sources of low molecular weight carbohydrates, and additionally information regarding Sears' marketing, sales and pricing information, did not constitute trade secrets.

Cargill also argues that even if the information at issue can be properly regarded as a trade secret, the misappropriation claim is undermined by the fact that it was freely disclosed by Sears during a meeting in July of 1999 with Cargill representatives. In support of this contention Cargill offers numerous record cites which are strongly suggestive of the conclusion that the confidential information was in fact disgorged during that meeting. Nonetheless, at this juncture I am required to resolve all ambiguities, and draw all inferences, favorable to Sears. Since there is at least some degree of ambiguity and inconsistency among the various versions as to what exactly was disclosed during the roughly one hour meeting in July of 1999, summary judgment resolving this claim is inappropriate.

It must also be recalled that prior to that July meeting a letter was generated by Cargill specifying that it was to be non-confidential, and providing that

> Our agreement to meet with you is contingent on your acknowledgment that no confidential information or otherwise proprietary information shall be exchanged.

Marks Trade Secret Aff. Exh. 7. A reasonable factfinder could well find it illogical to assume that a reasonably sophisticated businessman such as David Wood, in the face of that letter, would disclose the '793 invention during a one hour meeting, follow that disclosure by entering into a confidentiality agreement which did not shield the earlier disclosed information, and then meet again for nearly a day in Ohio to discuss the matter further. Since the record is susceptible to a finding that the specifics of the invention were not disclosed during the earlier, one hour meeting, and that only the general nature of the invention was discussed during that meeting, I will deny Cargill's motion for summary judgment dismissing Sears' trade secret misappropriation counterclaim.

Sears' breach of contract counterclaim calls upon the court to interpret and apply the agreement entered into between the parties on August 18, 1999. That letter agreement, which was by its terms was to be construed under Minnesota law, defined confidential information to "mean all information, business plans, data, samples, specifications, processes, methods and formulae, relating to [biomaterial-based ice-melting and

corrosion inhibitor supplements] and its potential use by Cargill, that is owned by or in possession of [Sears] or Cargill." Marks Trade Secret Aff. Exh. 9, at C 002556. This definition is consistent with Minnesota law, which defines the term "confidential information" as 1) protected matter not generally known or readily ascertainable, 2) providing a demonstrable competitive advantage, 3) that was gained at expense to the employer, and 4) that the employer intended to keep confidential. *Cherne Indus., Inc. v. Grounds & Assocs., Inc.*, 278 N.W.2d 81, 90 (Minn. 1979). The confidentiality agreement also includes exclusionary language, providing that

> [c]onfidential Information shall not include that which: (a) is in the public domain prior to the disclosure of the receiving party; (b) is lawfully in the receiving party's possession prior to the disclosure by the other party; (c) becomes part of the public domain by publication or otherwise through no unauthorized act of omission on the part of the receiving party; or (d) is independently developed by an employee(s) of the receiving party with no access to the disclosed Confidential Information.

Marks Trade Secret Aff. Exh. 9, at C 002557.

For the same reasons articulated above with regard to the trade secret misappropriation claim, I am unable to say that no reasonable

factfinder could conclude that the disputed information constituted "confidential information," as defined under the parties' agreement and Minnesota law. Similarly, I cannot conclude from the present record that no reasonable jury could find that Cargill breached its obligations under this confidentiality agreement by misappropriating to its own use allegedly confidential information disclosed by Sears during the August, 1999 meeting.

Based upon the foregoing, I find that Cargill is not entitled to summary judgment dismissing Sears' common law misappropriation of trade secrets and breach of contract counterclaims.[37]

H. <u>Limitation of Damages on Common Law Counterclaims</u>

In its motion Cargill has requested that in the event Sears is permitted to pursue its trade secret and breach of contract counterclaims at trial, the availability of damages on those claims should nonetheless be limited based upon certain public disclosures of the information at the

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[37] Cargill has also requested summary dismissal of Sears' additional counterclaims for unfair competition, breach of an implied covenant of good faith and fair dealing, and unjust enrichment based upon the same arguments advanced in support of its summary judgment motion addressing the trade secrets and breach of contract claims. Because of my finding the existence of genuinely disputed, material issues of triable fact, I also deny this aspect of Cargill's summary judgment motion for the same reasons.

heart of those claims. Cargill argues that once the invention taught in the '793 patent entered the public domain through a series of events, including the issuance of the patent itself, any injury associated with the allegedly wrongful misappropriation of disclosed trade secrets ended and was no further compensable beyond that point.

In its response to Cargill's efforts to limit damages Sears acknowledges the principle, fairly characterized by it as "unremarkable", that the issuance of a patent is inconsistent with, and undermines, further recovery of damages for a claimed misappropriation of a trade secret forming the basis for the patent. *Ferber v. Sterndent Corp.*, 51 N.Y.2d 782, 784, 412 N.E.2d 1311, 1312, 433 N.Y.S.2d 85, 86 (1980); *Conmar Prods. Corp. v. Universal Slide Fastener Co.*, 172 F.2d 150, 155-56 (2d Cir. 1949). Any recovery following the issuance of a patent for continued unauthorized use of the invention by the patent claims is properly governed by applicable patent laws, including 35 U.S.C. § 284. Sears also notes in its response that it does not anticipate, and is not requesting, recovery of double damages – that is, compensation for the same injuries under different theories, including misappropriation of trade secrets and patent infringement. It argues, nonetheless, that the affixing of damages

is a question of fact for the jury, relying on *Hydro Investors, Inc. v. Trafalgar Power Inc.*, 227 F.3d 8, 18 (2d Cir. 2000). In this instance, Sears contends that the trade secret misappropriation by Cargill deprived it of the benefit of being "the first mover" in the relevant market. In support of that contention, Sears cites the report of its economic expert, Professor Blaydon, explaining this phenomenon.

In my view it would be imprudent at this juncture to place unwarranted strictures on the jury's award of damages under the various theories advanced by Sears, assuming a finding of liability on one or more of those claims. Instead, at trial I intend to provide the jury with appropriate instruction concerning the measure of damages to be awarded in connection with each counterclaim on which liability is found, taking care to insure against double recovery. Should such a duplicitous award be made, and the jury find it appropriate to award trade secret damages extending over a period beyond the issuance of the '793 patent, in that event I can exercise my prerogative under Rule 50 of the Federal Rules of Civil Procedure to set aside any jury damage award which runs afoul of these principles.

Cargill's motion for summary judgment limiting the damages

recoverable in this case by Sears in connection with its counterclaims is therefore denied.

I. <u>Exclusion Of Bodycote Laboratory Reports</u>

_____Although not formally seeking this relief, in a memorandum addressed to the question of claim construction Cargill seeks the exclusion of two reports from Bodycote, one entitled "Preliminary De-icer Sample Analysis", dated April 28, 2003, and the other a "Viscosity" report, dated October 17, 2003. Both of those reports were produced by Sears on December 5, 2003, after the close of fact discovery on September 19, 2003. Cargill contends that because they were not properly disclosed during fact discovery, but were instead initially withheld on the basis of attorney-client privilege, those reports are automatically excludable under Rule 37(c)(1) of the Federal Rules of Civil Procedure.[38] Because those reports were considered and relied upon by Sears' claim construction

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[38] That rule provides, in pertinent part, that

> [a] party that without substantial justification fails to disclose information required by Rule 26(a) . . ., is not, unless such failure is harmless, permitted to use as evidence at a trial, at a hearing, or on a motion any witness or information not so disclosed.

Fed. R. Civ. P. 37(c)(1).

expert, I will consider the motion even though it was not properly brought and prefaced by permission from the court.[39]

At the outset I note that the requested relief – exclusion under Rule 37 of the Federal Rules of Civil Procedure – is a somewhat harsh remedy, because of its obvious effect of depriving the court and finder of fact of otherwise potentially relevant information to be used in deciding the issues in the case. *New York v. Almy Bros., Inc.,* 90-CV-818, 1998 U.S. Dist. LEXIS 1280, at *25-*27 (N.D.N.Y. Feb. 4, 1998) (McCurn, S.J.) (citing, *inter alia*, *Hinton v. Patnaude*, 162 F.R.D. 435, 439 (N.D.N.Y. 1995) (McAvoy, C.J.)). Because of the preference to have issues and claims decided on their merits, rather than on the basis of a procedural shortcoming, the exclusion of otherwise relevant evidence on technical grounds is generally not favored, absent compelling circumstances. *See* *Magedson v. Fina*, No. 91-CV-213, 1993 WL 113489, at *2 (N.D.N.Y. Apr. 12, 1993) (McCurn, S.J.).

As a technical matter Cargill's argument that the two Bodycote reports should have been produced prior to the close of fact discovery

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[39] This court's local rules require that before any non-dispositive motion is made a conference must be conducted, and permission to file a motion must be given by the court. N.D.N.Y.L.R. 7.1(b)(2).

may be well-taken. Nonetheless, it appears that by agreement of the parties the deadline for completion of expert disclosure was extended until December 12, 2003, and that the parties negotiated an arrangement under which an exchange of documents relied upon by the parties' experts was to occur not later than December 5, 2003 in connection with the Sears experts. As documents relied upon by Sears' claim construction expert, Professor E. Bruce Nauman, the two disputed documents were timely produced in accordance with that agreement.[40]

Having reviewed the record and Cargill's application, I find no prejudice resulting from the arguably untimely disclosure of the two disputed documents. After the two disputed reports were produced they were utilized by Cargill in its deposition of Sears' claim construction expert, Professor Nauman. Under these circumstances, I find that to the extent that there may arguably have been a failure to timely disclose, it was harmless, and Sears has offered at least some plausible justification for its delay in producing the documents. Accordingly, Cargill's motion to strike the two disputed reports will be denied.

J. <u>Motion To Strike Expert Reports Of Cameron Weiffenbach</u>

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[40] It also appears that both sides continued to make rolling production of documents extending beyond the fact discovery cutoff.

Among the experts retained in this case by Cargill is Cameron Weiffenbach. Weiffenbach, a practicing attorney, holds bachelors and masters degrees in chemistry, and worked in various positions at the PTO from 1967 until his retirement in 1999, including as a patent examiner, protest examiner, special program examiner, supervisory special program examiner, director of the office of enrollment and discipline and, during his last five years of service, as examiner-in-chief at the Board of Patent Appeals and Interferences. Weiffenbach currently practices of counsel with McDermott, Will & Emery in that firm's Washington, D.C. office, engaging in matters primarily involving patent prosecution and litigation.

Though Weiffenbach did not testify during the recent claim construction hearing, he has authored four separate reports in the case, all of which are in the record now before the court, opining on several matters in controversy. Sears now moves to strike the Weiffenbach reports from the record on a variety of bases including, generally, lack of personal knowledge, the impropriety of Weiffenbach offering legal conclusions, and the admissibility of his scientific opinions under Rule 702 of the Federal Rules of Evidence.

In his reports, Weiffenbach offers opinions on a variety of matters

which are fairly expansive in scope. In his primary report, Weiffenbach opines regarding assorted issues relating to the '793 patent, including its effective priority date; claim construction; unpatentability under 35 U.S.C. § 112, first paragraph (requiring enablement of an invention over a broad scope of the claimed subject matter); unpatentability under 35 U.S.C. § 102(a), (b) and (f) based, *inter alia*, upon prior art and lack of novelty; patent anticipation; the claim that David Wood and Robert Hartley are not the inventors of the subject of the '793 patent; obviousness; and inequitable conduct, based upon the failure to disclose known references and art to the patent examiner. In his rebuttal and supplemental rebuttal reports, Weiffenbach expresses his belief that Sears and one of the '793 inventors, David Wood, disclosed the claimed trade secret information which is the subject of Sears' common law claims to Cargill, freely without conditions, in July of 1999, and further opines that in any event the information disclosed does not qualify as a trade secret.

Sears' motion to strike is brought under Rule 56(e) of the Federal Rules of Civil Procedure, which requires the court to examine the ultimate issue of whether the disputed reports, or testimony consistent with those

reports, would be admissible at trial.[41] *Raskin v. Wyatt Co.*, 125 F.3d 55, 65-67 (2d Cir. 1997). That analysis, in turn, requires consideration of the federal evidentiary principles governing admission of expert testimony.

The Federal Rules of Evidence permit receipt of expert testimony at trial under certain prescribed circumstances, providing that

> [i]f scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise, if (1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case.

Fed. R. Evid. 702; *see also Kumho Tire Co., Ltd. v. Carmichael,* 526 U.S. 137, 119 S. Ct. 1167 (1999); *Daubert v. Merrell Dow Pharms., Inc.,* 509 U.S. 579, 113 S. Ct. 2756 (1993). While at common law expert testimony

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[41] That rule provides, in relevant part, that

> [s]upporting and opposing affidavits shall be made on personal knowledge, shall set forth such facts as would be admissible in evidence, and shall show affirmatively that the affiant is competent to testify to the matters stated therein.

Fed. R. Civ. P. 56(e).

addressing an "ultimate issue" was not permitted, that dictate has been abrogated by Rule 704(a), which provides that "testimony in the form of an opinion or inference otherwise admissible is not objectionable because it embraces an ultimate issue to be decided by the trier of fact." Fed. R. Evid. 704(a).

Applying Rule 704(a), the general consensus among the various courts is that expert testimony which embraces a legal conclusion should be excluded. *See Hygh v. Jacobs*, 961 F.2d 359, 363-64 (2d Cir. 1992). Citing an advisory committee note, explaining elimination of the distinction between admissible and excludable expert opinion testimony skirting an ultimate issue, one court has noted that

> [u]nder Rules 701 and 702, opinions must be helpful to the trier of fact, and Rule 403 provides for exclusion of evidence which wastes time. These provisions afford ample assurances <u>against the admission of opinions which would merely tell the jury what result to reach</u>, somewhat in manner of the oath-helpers of an earlier day. They also stand ready to exclude opinions phrased in terms of inadequately explored legal criteria. Thus the question, "Did T have capacity to make a will?" would be excluded, while the question, "Did T have sufficient mental capacity to know the nature and extent of his property and the natural objects of his bounty and to formulate a rational scheme of distribution?" would be allowed.

Hygh, 961 F.2d at 363-64 (quoting Fed. R. Evid. 704 advisory committee's note and adding emphasis).

Using these and other relevant guideposts, the parties and court will undoubtedly be required to carefully navigate turbid waters at or prior to trial to determine which portions Weiffenbach's testimony to admit, should he be proferred by Cargill as an expert witness. Undoubtedly, Weiffenbach could be permitted to testify on certain matters on which he has offered views. By way of example, Weiffenbach's testimony based upon his experience as a patent attorney and former PTO employee regarding procedures within that agency and the patent application process itself might prove to be helpful to the trier of fact, and thus permissible. *See Bausch & Lomb, Inc. v. Alcon Labs., Inc.*, 79 F. Supp.2d 252, 255 (W.D.N.Y. 2000). Other portions of Weiffenbach's testimony might also be admissible, including his opinions concerning the effective filing date of the '793 patent. *Id.* at 257. Portions of Weiffenbach's reports addressing other issues, however, appear to be more in the nature of legal argument more appropriately contained in a brief or memorandum, and testimony consistent with those excerpts would be plainly excludable. *Id.* at 258.

In a similar vein, Weiffenbach's opinions concerning Sears' trade secret misappropriation counterclaim would be plainly inadmissible; I am prepared and fully able to instruct the jury concerning the applicable law of trade secrets, and the jury can, after hearing the evidence, draw its own conclusions as to whether or not trade secret information was unconditionally disclosed, with no restrictions, by Sears to Cargill in July of 1999 or instead misappropriated by Cargill after disclosure in the first instance in August of that year. As was noted by Chief District Judge David Larimer in a somewhat similar case,

> [h]ow [the expert] is competent to testify about any of these matters is beyond me. He was not involved in any way in any of the relevant events, and his knowledge is strictly secondhand. Moreover, I cannot see how any of his proposed testimony constitutes expert opinion testimony under Rule 704. [The expert's] purpose in testifying is to render his opinions about certain matters, not to testify about the facts of this case. Although he does state that he intends to testify that [plaintiff] engaged in unfair competition by misappropriating [defendant's] trade secrets, that is a matter solely for a jury to decide, and is not appropriate "expert" opinion testimony. [The expert] is offered as an expert on patent law and procedure, not on the law of unfair competition, and whether [plaintiff] engaged in unfair competition is well within the ken of a properly-instructed jury to decide.

Id. at 259 (citations omitted). For reasons similar to those voiced by Chief

Judge Larimer in *Bausch & Lomb*, Weiffenbach's testimony regarding the common law counterclaims will not be permitted at trial.[42]

While clearly the issue will have to be revisited at trial, at this juncture I need only address Sears' request that the Weiffenbach reports be stricken from the record and not considered by the court in connection with the pending dispositive motions. In ruling upon the pending motions, I have considered the Weiffenbach reports, but in the light of the foregoing discussion. Accordingly, to the extent that the reports contain legal argument and conclusions, I have treated them as being in the nature of legal memoranda having no particular evidentiary value. Because of Weiffenbach's chemical and PTO background, however, I have considered his opinions in assisting me to interpret the claims of the '793 patent. *Amsted Indus., Inc. v. National Castings, Inc.*, No. 88 C 924, 1990

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[42] Sears' objection to this portion of the testimony rests upon alleged lack of personal knowledge, and relies upon several cases including *B.F. Goodrich v. Betkoski*, 99 F.3d 505 (2d Cir. 1996), *cert. denied sub nom., Zollo Drum Co., Inc. v. B.F. Goodrich Co.*, 524 U.S. 926, 118 S. Ct. 2318 (1998). The fact that the expert does not possess personal knowledge on the matters upon which he or she is opining is not unusual – in fact, is quite normal – and does not provide a basis to exclude the proferred testimony assuming that the court is convinced that the requirements of Rule 702 have been met. I do not therefore exclude Weiffenbach's expert testimony regarding the trade secret claims on this basis, but rather because in my view those claims are not properly the subject of expert testimony, and additionally because Weiffenbach has not to date been properly qualified as an expert to testify on those areas.

U.S. Dist. LEXIS 8553, at *89 (N.D. Ill. July 11, 1990). I have also considered the Weiffenbach reports on the question of anticipation and obviousness as one of the many excerpts in the record addressed to those issues. *Id.*, at *90.

Because of the posture of the case, I will deny Sears' application to strike the Weiffenbach expert reports, without prejudice to the right to object to the admission of his testimony, wholly or in part, at trial or through motion *in limine* filed prior to trial. When making and opposing any such motion, the parties should be guided by the foregoing discussion as well as various cases including, notably, *Bausch & Lomb, Inc.*

IV. SUMMARY AND ORDER

Having reviewed the '793 patent, the documents associated with its prosecution, and a recitation and description of the prior art, and taking into account the various information supplied to the court by the parties' respective experts, I have now fulfilled my obligation to resolve the parties' differences regarding claim construction as a matter of law. Against that backdrop, I find genuine issues of material fact and am therefore unable to say that no reasonable factfinder could conclude infringement on Cargill's part of one or more of the claims set forth in the '793 patent, as

construed, with respect to its ClearLane Liquid and ClearLane PNS Liquid products. Additionally, I find issues of fact which preclude the entry of summary judgment dismissing defendants' counterclaims for willful infringement, and am unable to resolve as a matter of law the arguments with regard to invalidity and unenforceability, in view of the genuine issues of material fact which exist and must be resolved in order to determine those defenses, except as relates to Cargill's claim that Bodycote should have been listed as an inventor on the applications which gave rise to the '793 patent.

Based upon the foregoing it is hereby

ORDERED as follows:

1. The disputed claims of the '793 patent are hereby construed by the court as follows:

Terms	Construction
"de-icing and anti-icing composition"	a composition whose intended purpose, through direct or indirect application, is to keep roadways free or rid of ice, or to prevent its formation on such surfaces
"aqueous solution"	a uniformly disbursed liquid mixture of two or more components, one of which

	is water, and which can contain incidental amounts of insoluble components
"low molecular weight carbohydrate"	a material which includes carbon, hydrogen, and oxygen where the ratio of hydrogen to oxygen is the same as in water, and that is obtained from a refined and consistent source
"balance"	aside from the other specified ingredients, including low molecular carbohydrates and chloride salts, and with the possible addition of colorants and thickeners, as well as incidental impurities or harmless ingredients associated with the commercial sources of the key components in the invention, the solution shall contain only water
"colorant"	a substance or material, whether inherent in or separately added to the specified composition, which imparts color to the composition
"thickener"	a substance or material, whether inherent in or separately added to a composition, which causes an increase in the composition's viscosity

2. Cargill's motion for summary judgment on the issue of patent invalidity, based on anticipation, is DENIED.

3. The motions of both Cargill and Sears for summary judgment on the question of inequitable conduct, based upon failure to disclose

prior art, are DENIED.

4. Sears' motion for summary judgment on the issue of inequitable conduct, based upon the question of inventorship, is GRANTED, and that portion of Cargill's defense to Sears' infringement counterclaims is DISMISSED.

5. Cargill's motion for summary judgment dismissing Sears' infringement counterclaims as a matter of law is hereby GRANTED with respect to ClearLane Liquid Plus, ClearLane Treated Salt, and ClearLane PNS, but is DENIED as to ClearLane Liquid and ClearLane PNS Liquid, based upon the court's finding of the existence of genuine issues of material fact;

6. Cargill's motion for summary judgment dismissing Sears' claims of willful infringement is DENIED.

7. Cargill's motion for summary judgment dismissing Sears' common law counterclaims or, alternatively, limiting damages awardable on those counterclaims, is DENIED.

8. Cargill's motion to exclude two reports from Bodycote allegedly disclosed in an untimely manner is DENIED.

9. Sears' motion to strike the report of Cameron Weiffenbach and

to preclude him from testifying at trial is DENIED, without prejudice to renewal either on pre-trial motion *in limine*, or at trial.

10. The court will conduct a conference in this matter, to be held by telephone, on September 8, 2004 at 11 a.m. to discuss the case and establish a trial date and the deadline for submission of pre-trial filings. Plaintiff's counsel is hereby directed to initiate the call on that date.

Dated: August 27, 2004
Syracuse, NY

David E. Peebles
U.S. Magistrate Judge

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF NEW YORK

SEARS PETROLEUM & TRANSPORT CORP. and SEARS ECOLOGICAL APPLICATIONS CO., LLC, Plaintiffs, v. ARCHER DANIELS MIDLAND COMPANY, DEICERS USA, LLC, GLACIAL TECHNOLOGIES, MLI ASSOCIATES, LLC., AND MINNESOTA CORN PROCESSORS, LLC. Defendants.	Civil Action No.: 03-CV-1120 (DNH/DEP)

SEARS' MEMORANDUM OF LAW IN OPPOSITION TO DEFENDANTS' MOTION TO STAY DISCOVERY

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Plaintiffs Sears Petroleum & Transport Corp. and Sears Ecological Applications Co., LLC (together, "Sears") respectfully submit this memorandum of law in opposition to the motion of defendants Archer Daniels Midland Company, Deicer USA, LLC, Glacial Technologies, and Minnesota Corn Processors, LLC ("MCP") (collectively, the "ADM Defendants"), for a stay of discovery until this Court decides a summary judgment motion which Defendants expect Cargill, Inc. to file in the case Cargill v. Sears Petroleum et ano, Civ. Act. No. 03 CIV 530. (One other defendant, MLI Associates, LLC, has not joined in the ADM Defendants' motion.)

PRELIMINARY STATEMENT

The ADM Defendants' motion presents an olio of misstated facts, inapposite law and flawed logic. Indeed, had the ADM Defendants, before filing their motion, merely reviewed the transcript of the deposition taken in the Cargill case of their own key witness, former MCP employee and alleged "Caliber" inventor Stephen Bytnar, they would have realized that the key contentions on which they rely are untrue. While a discovery motion is not usually the context in which such factual issues are resolved, in this case, the ADM Defendants' claims are so plainly averse to the record developed in discovery in the Cargill case that even a brief review should be sufficient to debunk the entirety of the ADM Defendants' presentation.

Procedurally, the stay that the ADM Defendants propose would be completely open-ended and extremely unfair and prejudicial to Sears. The ADM Defendants want all meaningful discovery in this case stayed until this Court rules on a predicted summary judgment motion from Cargill. Because of a scheduling conflict on the part of Cargill's counsel, that motion will not be heard until May 2004 at the earliest. At that point, it is quite possible the Court will then need additional time to rule upon the dispositive and claim construction motions filed by Sears and Cargill. In the interim, the ADM Defendants would be able to continue their infringing

conduct and invasion of Sears' market as if this case did not exist.

As discussed below, to obtain a stay of discovery, a litigant must establish a "pressing need" for one. Here, the ADM Defendants allege no undue burden from discovery. Rather, they only speculate on the outcome of a motion in another case that has not even been filed yet. There are a number of issues in the instant case, however, that are not before the Court in the Cargill case (e.g., infringement and validity issues arising out of Sears' '622 Patent). Such issues will need to be resolved in this case, whatever the outcome in Cargill.

It is precisely for these sorts of reasons that both the Second Circuit and the Federal Circuit have set a high bar for parties seeking to stay discovery. The ADM Defendants have not come even close to surpassing that bar here. The motion by the ADM Defendants should therefore be denied in its entirety, and the Court should direct fact discovery to proceed in this case forthwith.

FACTS

By this suit, Sears alleges that the defendants are manufacturing and selling a road deicer product, sold under the brand name "Caliber," which infringes United States Patent Nos. 6,299,793 (the "'793 Patent") and 6,582,622 (the "'622 Patent"), both assigned to Sears by Inventors Robert Hartley and David Wood. Exs. B, C. Making only a pro forma defense to infringement, the ADM Defendants apparently contend that the '793 Patent is invalid for two reasons: (a) because the co-inventor of the '793 Patent, Robert Hartley, supposedly "derived" somehow the underlying invention from a former MCP employee, Stephen Bytnar; and (b) because MCP allegedly sold its infringing "Caliber" product commercially more than one year prior to what they contend should be the effective date of the '793 Patent. As set forth below, the ADM Defendants' reliance on these defenses is utterly misplaced.

A. **The Hartley/Wood Invention Pre-Dates The Bytnar "Invention" By At Least Six Months**

Perhaps the most egregious aspect of the ADM Defendants' motion papers is their innuendo that Robert Hartley somehow misappropriated the inventive concept in the '793 Patent from Stephen Bytnar. (In 1998 and early 1999, the two men had dealings as part of a joint venture between Sears and the Ice Ban Corporation, to whom Mr. Bytnar had been assigned, to distribute "Ice Ban" brand deicer.) The ADM Defendants cite no evidence for this outrageous allegation (which even Mr. Bytnar does not allege), and for good reason.

At his deposition in the Cargill case, Mr. Bytnar claimed that he first came upon his own rival "invention" (a deicer formula based on commercially available corn syrup) in late June 1999. Ex. D at 50. Even taking Mr. Bytnar at his word, this "discovery" occurred some six months after Robert Hartley and David Wood had confirmed their own similar invention – the latter copiously documented in a series of contemporaneous reports by an independent laboratory, Bodycote Ortech, Inc. ("Bodycote"). Specifically, by December 1998, Messrs. Hartley and Wood had already established the synergistic effect of low molecular weight carbohydrates and chloride salt on freezing point depression. Exs. E, F. By January 1999, they had filed a patent application on that invention, disclosing the use of "sugars" (which are low molecular weight carbohydrates) in combination with chloride salts. Ex. G. By April 1999, they had obtained and begun testing of fifteen commercially available corn syrups as potential formulations of the invention. Ex. H at 2. Finally, by June 1999, final testing results had confirmed Hartley's and Wood's conclusion as to the efficacy of corn syrup as a source of the low molecular weight carbohydrate component. Ex. I.

The foregoing invention and product formulation all took place before Mr. Bytnar

himself even claims to have started his own research as to his competing "invention." Moreover, Messrs. Hartley's and Wood's rigorous testing protocol contrast sharply with Mr. Bytnar's serendipitous account of how he made his own discovery:

> Q You -- you mentioned that around June of 1999, when you were taking a break between Ice Ban and going back to MCP, you came up with the idea for the Caliber product?
>
> A Yes.
>
> Q Can you tell me how it was you came up with that idea?
>
> A It's an interesting story, and one I've told a number of times in presentations describing the Caliber product. ...
>
> As I'm sitting there mowing my lawn, somebody -- it was like somebody hit me in the back of the head with a shovel, and I realized that I probably knew more about the chemistry of de-icers than anybody else in the industry, and I believed I had half a brain. And I conceived that I thought I could make a better product. Recalled some of the things on why the product worked. ...
>
> The next morning, I was in the laboratory with a rather complicated matrix of tests to begin testing across carbohydrate profiles, and I simply got lucky and hit it on the second day. And hit close enough to the right formulation that I could formulate from there to the finished product that we wanted.

Ex. D at 50-52. In subsequent testimony, Mr. Bytnar states that the alleged breakthrough took place in the final few days of the month of June. Ex. D at 58.

Perhaps the most interesting aspect of Mr. Bytnar's account is the timing. He claims to have received his epiphany about corn syrup and carbohydrates just a few days after losing his assignment with the Ice Ban Corporation, where he had been dealing with Mr. Hartley. Perhaps that is mere coincidence. However, the story suggests one other possibility – namely, that Mr.

Bytnar derived his claimed invention from Messrs. Hartley's and Wood's earlier research. This is one of many issues which Sears wishes to explore in discovery.

For the time being, it is sufficient to note that the ADM Defendants' contention that Mr. Bytnar somehow taught Mr. Hartley the chemistry of deicing is risible. Robert Hartley is a Fellow of the Royal Chemists Society, a Chartered Chemist, and an accredited Corrosion Specialist. He has worked for more than forty years as an industrial chemist, during which he has published twenty-five research papers, conducted numerous training courses, and served in various corporate and managerial capacities, supervising hundreds of other chemists. Mr. Hartley had researched ice-related subjects long before running into Mr. Bytnar, including work for the Royal Canadian Navy on ice adhesion to ships in the Arctic and North Atlantic Oceans. That research resulted in a published article in the Journal of Coatings Technology, Vol. 64, No. 815, Dec. 1992, entitled "Adhesion to Ice Coatings and the Performance of Ice Release Coatings." Mr. Hartley hardly needed the services of Mr. Bytnar (who is not even a chemist by profession or degree) to explain deicing to him. Exs. J, K.

Indeed, to Sears' knowledge, Mr. Bytnar has never claimed that the invention disclosed in the '793 Patent was "derived" from his work in any way. For the ADM Defendants to raise that allegation now, without any evidentiary support, in the context of a discovery motion, is at best premature and at worst mendacious.

B. The '793 Patent Is Entitled To At Least A January 1999 Priority Date

Pursuant to 35 U.S.C. § 120, "[a]n application for patent for an invention disclosed in the manner provided by the first paragraph of section 112 of this title in an application previously filed in the United States . . . which is filed by an inventor or inventors named in the previously filed application shall have the same effect, as to such invention as though filed on the date of the prior application ...." (Emphasis added.) Section 112, in turn, requires in relevant part that the patent "shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains ... to make and use the same." 35 U.S.C. § 112.

In this case, the '793 Patent claims the benefit of earlier, parent applications. First, on January 7, 1998, Sears filed provisional application No. 60/070,636, in which Messrs. Hartley and Wood first described their preliminary inventive concept that the use of refined agricultural products, as opposed to waste products, would overcome the problems of current deicer formulations. Ex. L. Then, on January 4, 1999, Sears filed utility patent application No. 09/224,906. Ex. G. Both the 1998 and 1999 applications expressly disclosed sugars (which are low molecular weight carbohydrates) to be used in combination with inorganic salts as freezing point depressants. Exs. L at 3, 10, G at 3, 10. Finally, on January 5, 2001, Sears filed continuation-in-part application No. 09/755,587, describing a more focused subset of the invention described in the two earlier patent applications, and with additional embodiments. Ex. M. The PTO issued the '793 Patent on October 9, 2001. Ex. B.

In their motion, the ADM Defendants claim that: "the first (and only) patent application in the chain to disclose a range of molecular weights for the carbohydrate component of the claimed deicer composition is the third [i.e., 2001] Sears application.," and therefore the '793

Patent does not receive the benefit of either the 19998 or 1999 filing date.[1]

That is simply not the case. Rather, as Professor E. Bruce Nauman[2] explained in his expert report in the Cargill case, both parent applications disclosed, inter alia, "sugars (hexoses, saccharides)" to be used with chloride salts for freezing point depression. At the time of the invention, a person of ordinary skill in the art would have understood sugars to be carbohydrates, and the molecular weights of such carbohydrates to range from 180 (for hexoses) to up to about 1476 (for oligosaccharides). Claims 1-6 of the '793 Patent disclose this same molecular weight range: "about 180 to 1500." Professor Nauman further notes that at least two examples in the 1999 application (molasses and maltodextrin no. 15) show low molecular weight carbohydrates within the limits of the '793 patent. Thus, to a person with ordinary skill in the art, the subject matter of the '793 Patent is fully described and enabled by the specifications in the 1998 and 1999 parent applications. Ex. N at 26-30.

Under 35 U.S.C. § 120, such proof is more than sufficient for Sears to be able to reach back to the earlier filing dates. As this Court explained in ConMed Corp. v. Erbe Electromedizin

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1 In note 9 to their brief, the ADM Defendants further claim – again without any citation – that Messrs. Hartley and Wood sought, during the prosecution of the '793 Patent, to distinguish their invention from products "such as corn syrup and molasses." In reality, both corn syrup and molasses are cited as preferred embodiments of the Hartley/Wood invention. See Exs. B (Col. 8, Examples I-V), G at 8 (Table 4). In their '793 Patent, Messrs. Hartley and Wood took pains to distinguish between such refined sources of carbohydrates and the various waste products then in use, such as corn steep and desugared beet molasses. Ex. B (Col. 1, Lns. 24-53). While the names of these materials may sound similar (at least to the ADM Defendants' ears), a chemist would know these to be very different products.

2 Professor Nauman holds an M.S. degree in Chemical Engineering from the University of Tennessee, and a Ph.D. degree in Chemical Engineering from the University of Leeds (England). Since 1981, Professor Nauman has served as a full professor of Chemical Engineering at Rensselaer Polytechnic Institute (RPI). He is a past Chairman of the Chemical Engineering Department at RPI. Prior to that, Professor Nauman worked in scientific and management positions for thirteen years at Union Carbide Corporation and for four years at Xerox Corporation. He has been a member of the American Institute of Chemical Engineers (AIChE) for forty years, and is presently a Fellow of the AIChE. He has authored or co-authored four books, fourteen book chapters, over a hundred peer-reviewed articles in scientific journals, and numerous other publications. Professor Nauman has been awarded six U.S. Patents. In the Cargill case, Sears has designated Professor Nauman as an expert in chemistry and chemical engineering, Ex. O.

GmbH, 241 F. Supp. 2d 187, 193 (N.D.N.Y. 2003) (Hurd, J.), the terminology used in parent and continuation-in-part (CIP) applications need not be identical. Rather, a patentee is entitled to the priority date of an earlier application where the "claims in the CIP application are substantially based upon the disclosures contained in the parent application." Id.; accord, e.g., In re Daniels, 144 F.3d 1452, 1456 (Fed. Cir. 1998) (identical language not required).

Further, the fact that Sears continued to research additional product formulations of the Hartley/Wood invention after they had filed the 1999 application does not deprive Sears of the benefit of that earlier filing date. A patent applicant is not required to "predict every possible variation, improvement, or commercial embodiment of his invention." United States Steel Corp., et al. v. Phillips Petroleum Co., 865 F.2d 1247, 1250 (Fed. Cir. 1989) (patent filed as a CIP application entitled to rely on filing date of parent application where invention was fully enabled). Here, the invention disclosed in Sears' 1999 application was fully described and enabled, and thus Sears is entitled to reach back to that earlier date.

Accordingly, the alleged sales of "Caliber" product in late 1999 are not material to the validity of the '793 Patent, as the alleged sales occurred after, not before, the effective filing date of the '793 Patent. For this same reason, the ADM Defendants' attempt to bootstrap this argument into "anticipation" and "inequitable conduct" defenses must also fail, as the "Caliber" product is subsequent art, and thus neither anticipates the '793 Patent, nor need have been disclosed to the PTO as prior art during the prosecution of the '793 Patent. See, e.g., Kolmes v. World Fibers Corp., 107 F.3d 1534, 1540 (Fed. Cir. 1997) (finding no inequitable conduct where alleged "prior art" post-dated effective filing date of patent in dispute).

C. The Alleged 1999 Sales of "Caliber" Were Not Commercial Sales Of Anticipating Product

Pursuant to 35 U.S.C. § 102(b), an inventor shall be entitled to a patent unless "the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States ...." A party seeking to invalidate a patent pursuant to the "on sale" bar set forth in 35 U.S.C. 102(b) bears the burden of proving that the invention was on sale more than one year before the patent's effective date by "clear and convincing evidence." Ralston Purina Co. v. Far-Mar-Co., 772 F.2d 1570, 1574 (Fed. Cir. 1985).

Here, even if the '793 Patent were only accorded the latest possible effective date (i.e., January 5, 2001), the ADM Defendants still have no evidence that the invention disclosed in the '793 Patent was on sale commercially prior to January 5, 2000. The ADM Defendants offer only one 1999 sales invoice – a document purporting to show a November 24, 1999 sale of "Caliber Concentrate" from MCP to Envirotech Services, Inc. (Envirotech was MCP's distributor, not an end user.) However, that sale, even if accurately recorded in the document, would not implicate the on-sale bar set forth in 35 U.S.C. § 102(b), for two reasons.

First, the product which the ADM Defendants now claim was sold in 1999 does not anticipate the invention disclosed in Sears' '793 Patent. Every claim of the '793 Patent requires both a carbohydrate and a chloride salt; indeed, it is the synergy between these two components that creates the noteworthy freezing point depressant effect. Ex. B (Cols. 9-12). In his deposition, however, Mr. Bytnar conceded that the "Caliber Concentrate" product listed on the November 1999 invoice (on which the ADM Defendants now rely) did not contain any chloride salt; only carbohydrate: Ex. D at 116 ("That is the concentrate. All invoices will be for the concentrate. [MCP] did not have, nor ever did they have, magnesium chloride.")

Second, even assuming, <u>arguendo</u>, that the ADM Defendants could establish that MCP's distributor, Envirotech, mixed the concentrate with magnesium chloride and forwarded it on to end users during the calendar year 1999, Mr. Bytnar further admitted in his deposition that such transactions only would have constituted what he termed "field trials":

> The next logical step was at that time EnviroTech was the biggest distributor for the Ice Ban products. Called up Mr. Noff and said, I've taken this to the next level. If you guys want an option to sell it, we need to find somebody to apply it to the roads. And that's -- they -- they bought some product. We -- and we began running field trials that winter. Very early on, we realized it was going to work, and it was going to work well, and <u>we went from field trials in October [1999] to -- to full sales in January [2000]</u>.

Ex. D at 59 (emphasis added). Indeed, were there any doubt on this point, Envirotech's counsel (who was appearing at the deposition on behalf of Mr. Bytnar, who now works for Envirotech) then confirmed Mr. Bytnar's testimony, noting that the "subsequent purchase of larger quantities [of Caliber Concentrate] ... were used in field trials in the fall of 1999." <u>Id.</u> at 60.

This makes perfect sense. Mr. Bytnar contends that he formulated the "Caliber" product only in late July 1999. In order to sell a chemical road deicer to a government agency, it is usual for the product to first undergo rigorous testing and, only thereafter, agency acceptance. As a player in the alternative deicer market, Sears did not observe the "Caliber" product in commerce until well into 2000.

Such "field trials" do not trigger 35 U.S.C. § 102(b), which requires that "the sale or offer was primarily for profit rather than experimental purposes." <u>Kolmes,</u> 107 F.3d at 1540 (<u>quoting Keystone Retaining Wall Sys., Inc. v. Westrock, Inc.,</u> 997 F.2d 1444, 1303 (Fed. Cir. 1993)). Here, with respect to any 1999 sales of the "Caliber" product, the reverse was true. By the inventor's own admission, the product was not sold commercially until into 2000, less than one

year before the latest possible effective date for the '793 Patent. Thus, the ADM Defendants' argument necessarily fails here as well.

ARGUMENT

Under the long-standing precedent of both the Second and Federal Circuits, stays of discovery are heavily disfavored. See Nederlandse Erts-Tankersmaatschappij, N. V. v. Isbrandtsen Co., 339 F.2d 440, 442 (2d Cir. 1964) ("Only in rare circumstances will a litigant in one cause be compelled to stand aside while a litigant in another settles the rule of law that will define the rights of both."); Kahn v. General Motors, 889 F.2d 1078, 1083 (Fed. Cir. 1989) ("Precedent shows the general disfavor with which stays are viewed.").

"In considering whether to grant a stay of discovery, courts typically consider three principal factors: (1) the breadth of the discovery sought and the burden of responding to it; (2) whether the party opposing the stay would be unfairly prejudiced by a stay; and (3) the strength of the dispositive motion that is the basis for the discovery stay application." Valentine v. Carlisle Leasing Int'l Co., 1998 U.S. Dist. Lexis 15594, *5 (N.D.N.Y. Sept. 28, 1998) (affirming magistrate's denial of discovery stay). Here, the ADM Defendants have not alleged that they will be any great burden in discovery. Instead, they merely speculate as to the outcome of a dispositive motion in the Cargill case, a motion that has not yet even been filed. That is nowhere near sufficient to satisfy the applicable burden.

The Federal Circuit's decision in Kahn, cited above, provides a case in point. In that case, the district court had granted an indefinite stay of the proceedings in a patent infringement suit pending the resolution of related issues pertaining to the same patent in a case pending in another district. 889 F.2d at 1080. The Federal Circuit held this to be an abuse of discretion, because the movant had not demonstrated a "pressing need" for the stay, and because the other

case would not have served as "an adequate vehicle for the complete and prompt resolution of the issues between the parties." Id. at 1082. Here, as well, the ADM Defendants have demonstrated no pressing need, only a desire to delay the inevitable. And here too, the Cargill case cannot serve as a vehicle for the complete and prompt resolution of the issues between Sears and the ADM Defendants. Cargill makes and sells the cane molasses-based "ClearLane" product; the ADM Defendants make and sell a corn syrup-based "Caliber" product. At a minimum, therefore, the infringement issues will be different. In addition, there is a second patent (the '622 Patent) here which is not at issue in the Cargill case.

The sole case on which the ADM Defendants rely, Consolidated Aluminum Corp. v. Hi-Tech Ceramics, Inc., 7 U.S.P.Q.2d 1910 (W.D.N.Y. April 1, 1988), is clearly inapposite. In that case, the "plaintiff conceded on oral argument that it had no objection to a stay regarding the validity of the patents." Id. at 1911. Obviously, that made the court's decision a relatively easy one. Here, by contrast, Sears strongly objects to the proposed stay, and for good reason. As set forth in the Complaint, the ADM Defendants have already used a two-year delay, during which they falsely claimed interest in obtaining a license from Sears, to move aggressively into Sears' Northeast market with their infringing "Caliber" product. Patent holders are granted only a limited monopoly in their exclusive rights to their patent. If this action is stayed, Sears will have permanently lost such time in its right to the exclusive commercial use of the invention in the '793 Patent, time that Sears will never regain with respect to that patent.

The Court should not allow the ADM Defendants to delay the progress of this case any further. The motion should be denied, and discovery directed to proceed forthwith.

CONCLUSION

For the foregoing reasons, ADM Defendants' motion should be denied in all respects.

Dated: Syracuse, New York
February 23, 2004

Respectfully submitted,

SEARS PETROLEUM & TRANSPORT CORP. and SEARS ECOLOGICAL APPLICATIONS CO., LLC

By its attorneys,

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UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF NEW YORK

SEARS PETROLEUM & TRANSPORT CORP. and SEARS ECOLOGICAL APPLICATIONS CO., LLC, Plaintiffs, v. ARCHER DANIELS MIDLAND COMPANY, GLACIAL TECHNOLOGIES, METSS CORP., AND MINNESOTA CORN PROCESSORS, LLC. Defendants.	Civil Action No.: 03-CV-1120 (DNH/DEP)

AFFIDAVIT OF WILLIAM R. HANSEN

State of New York)
) ss.:
County of New York)

WILLIAM R. HANSEN, being duly sworn, deposes and says:

1. I am a member of the law firm of Duane Morris LLP, counsel to plaintiffs Sears Petroleum & Transportation Corp. and Sears Ecological Applications Co., LLC (together, "Sears"). I am admitted to practice law in the State of New York and before this Court. I submit this affidavit in opposition to the motion of defendants Archer Daniels Midland Company, Deicer USA, LLC, Glacial Technologies, and Minnesota Corn Processors, LLC for a stay of discovery .

2. Exhibit A is a true and correct copy of the First Amended Complaint dated

November 3, 2003.

3. Exhibit B is a true and correct copy of United States Patent No. 6,299,793.

4. Exhibit C is a true and correct copy of United States Patent No. 6,582,622.

5. Exhibit D is a true and correct copy of the transcript of the deposition of Stephen C. Bytnar dated September 25, 2003, in the case entitled Cargill v. Sears Petroleum et ano (the "Cargill case").

6. Exhibit E is a true and correct copy of a report from Bodycote to Sears dated December 11, 1998.

7. Exhibit F is a true and correct copy of a report from Bodycote to Sears dated December 31, 1998.

8. Exhibit G is a true and correct copy of United States Patent Application, Serial No. 09/224,906.

9. Exhibit H is a true and correct copy of a memorandum from John McNeill of Bodycote to David Wood et al. dated April 26, 1999.

10. Exhibit I is a true and correct copy of a report from Bodycote to Sears dated June 28, 1999.

11. Exhibit J is a true and correct copy of the curriculum vitae of Robert Hartley.

12. Exhibit K is a true and correct copy of a fax message from Robert Hartley to David Wood dated December 2, 1997.

13. Exhibit L is a true and correct copy of United States Provisional Application, Serial No. 60/070,636.

14. Exhibit M is a true and correct copy of United States Patent Application, Serial No. 09/755,587.

15. Exhibit N is a true and correct copy of the Rule 26, F.R.C.P. rebuttal report of a

Sears expert witness, Dr. E. Bruce Nauman, dated November 9, 2003, in the Cargill case.

16. Exhibit O is a true and correct copy of the curriculum vitae of Dr. E. Bruce Nauman.

WILLIAM R. HANSEN

Sworn to before me this
23rd day of February, 2004

Notary Public

NY\243752.1

MATTHEW J. STOWELL
Notary Public, State of New York
No. 01ST6061617
Qualified in Suffolk County
Commission Expires July 16, 200 7

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF NEW YORK

SEARS PETROLEUM & TRANSPORT CORP. and SEARS ECOLOGICAL APPLICATIONS COMPANY, LLC, Plaintiffs, v. ARCHER DANIELS MIDLAND COMPANY, DEICER USA, LLC, GLACIAL TECHNOLOGIES, MLI ASSOCIATES, LLC, and MINNESOTA CORN PROCESSORS, LLC. Defendants.	**JURY TRIAL DEMANDED** Civil Action No.: 03-CV-1120 (DNH)(DEP)

FIRST AMENDED COMPLAINT

Plaintiffs Sears Petroleum & Transport Corp. ("Sears Petroleum") and Sears Ecological Applications Co., LLC ("Seaco") (collectively, "Sears"), for their Complaint against defendants Archer Daniels Midland Company ("ADM"), Deicer USA, LLC ("DUSA"), Glacial Technologies ("GT"), MLI Associates, LLC ("MLI"), and Minnesota Corn Processors, LLC ("MCP") (collectively, "Defendants"), after an inquiry reasonable under the circumstances, as

will likely have evidentiary support after a reasonable opportunity for further investigation or discovery, hereby aver as follows:

PARTIES

1. Plaintiff Sears Petroleum is a New York corporation with its principal place of business at 1914 Black River Boulevard, Rome, New York 13440. Sears Petroleum is a joint owner of United States Patent Nos. 6,299,793 and 6,582,622, both entitled "De-icing Solution."

2. Plaintiff Seaco is a New York limited liability company with its principal place of business at 1914 Black River Boulevard, Rome, New York 13440. Sears Petroleum is Seaco's sole member. Seaco is engaged in the commercial deicing business, is a joint owner of United States Patent Nos. 6,299,793 and 6,582,622, and sells products under those patents using the trademarks ICE B'GONE® and ICE B'GONE® II.

3. Upon information and belief, defendant ADM is a Delaware corporation with its principal place of business in Decatur, Illinois.

4. Upon information and belief, defendant MCP was a Minnesota corporation with its principal place of business in Marshall, Minnesota. Upon information and belief, on or about September 5, 2002, MCP merged with ADM.

5. Upon information and belief, defendant DUSA is a Minnesota limited liability company with its principal place of business in Decatur, Illinois. Upon information and belief, DUSA is shell company set up by ADM, and DUSA's corporate officers are employees or officers of ADM, and DUSA operates for the benefit of ADM. Upon information and belief, DUSA is controlled and dominated by ADM.

6. Upon information and belief, defendant MLI is an Ohio limited liability company with its principal place of business in Columbus, Ohio. Upon information and belief, MLI's

corporate officers are employees or officers of METSS Corp., and MLI operates for the benefit of METSS Corp.

7. Upon information and belief, defendant GT is an Ohio limited liability company with its principal place of business in Malvern, Ohio. Upon information and belief, GT is a shell company that is the product of a joint venture by DUSA and MLI. Upon information and belief, GT is controlled and dominated by DUSA (which in turn is controlled and dominated by ADM) and MLI.

JURISDICTION AND VENUE

8. This Court has exclusive jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338 in that the Complaint states an action based upon a federal question relating to patents. Venue is proper in this District pursuant to 28 U.S.C. § 1400(b). This Court has personal jurisdiction over each Defendant because, upon information and belief, each of the Defendants has conducted business and commercial activities in this District and elsewhere in the United States, and committed acts of infringement in this District and elsewhere in the United States.

BACKGROUND

9. Sears. Sears Petroleum, a small family-owned business founded in 1940, is principally involved in the transportation, storage and sale of bulk petroleum products. It is based in Rome, New York, and operates an oil terminal in the Port of Albany. Sears Petroleum has nine full-time employees, and had sales last year of approximately $6.4 million. In the late 1990s, it entered the commercial deicing business; specifically, the manufacture, storage and sale of liquid deicing products for use in highway snow and ice removal. Since 1999, it has operated that business through Seaco, a New York limited liability company in which Sears Petroleum is the sole member. Seaco's customers are mostly governmental agencies and some private

companies in the Northeast. To date, Sears Petroleum has invested approximately $3 million developing Seaco and its deicing products. Although Sears Petroleum and Seaco are separate entities, the two companies share the same management and the same offices, and file a single tax return reflecting a single set of earnings.

10. Deicing Industry. In upstate New York and other parts of the United States beset by long winters and heavy snowfall, snow and ice build-up on highways, streets, bridges, parking lots and other paved surfaces presents a serious safety risk to drivers and pedestrians. The current state-of-the-art process for coping with snow and ice hazards usually involves applying a deicer material such as mined rock salt to road surfaces. However, rock salt corrodes vehicles and surfaces; run-off containing rock salt contaminates nearby land and water; and rock salt loses its deicing ability at +15° to + 20° Fahrenheit, depending on humidity.

11. Environmentally Friendly Deicers. In response, in the deicing industry there were developed alternative, less corrosive, more environmentally friendly and more effective deicers which use agricultural residues such as distillers and brewers condensed solubles, including one embodied in United States Patent No. 4,676,918 ("the '918 Patent") to which Sears Petroleum owns all rights. From 1997 to early 1999, Sears had operated a joint venture with Ice Ban America, Inc. to sell these residue products. MCP had participated by assigning one of its chemical engineers, Stephen Bytnar, to Ice Ban America, Inc. It became apparent to Sears, however, that these residue formulas presented their own set of problems. For example, such formulations suffer from practical difficulties in terms of storage, biological degradation, odor, and clogging of filters and spray nozzles, and environmental issues from phosphorous compounds and heavy metals. In addition, sources for these residues create batches that can vary widely in character. These distiller and brewer-based residue products are typically mixed with

magnesium chloride ($MgCl_2$), a less corrosive salt than rock salt ($NaCl_2$), and are either applied as a liquid or used to "pre-wet" or "treat" rock salt.

12. Sears' Decision To Develop Better Deicer. There has long been a need for a "synthetic" (*i.e.*, processed) agricultural-based deicing solution that could ameliorate the severe environmental and corrosion problems of rock salt-based deicing, while improving the efficacy of prior waste product formulations. In November 1997, David Wood, Sears Petroleum's Vice President and Seaco's President, retained Robert Hartley, a Chartered Chemist and a Fellow of the Royal Society of Chemistry, to conduct scientific research on these deicing issues. Mr. Hartley did not have his own laboratory, so in 1998 Sears paid a Canadian materials testing laboratory, Bodycote Ortech Inc. ("Bodycote"), to conduct a testing protocol designed by Mr. Hartley and carried out under Mr. Hartley's direction with Mr. Wood's input.

13. Sears' Provisional Patent Application. Soon after Robert Hartley's retention, on January 7, 1998, Sears filed a provisional patent application, Serial No. 60/070,636, in which Sears first described its discovery that the use of a combination of three components in a deicing formulation -- a freezing point depressant, film former, and water -- overcomes the problems of the prior deicing solutions described above. The purpose of a freezing point depressant is to enable the deicer to melt ice and snow at temperatures as low as -20° Fahrenheit (as opposed to temperature limits of +15° to +20° Fahrenheit for untreated rock salt), aiding snow and ice removal and road safety. It also eliminates the need for calcium chloride and/or sand, which are even more harmful to the environment. The application listed $MgCl_2$ plus several organic materials suitable as freezing point depressants, including, among others, sugars such as hexoses and sacharrides, which are low molecular weight carbohydrates.

14. Confirmation of Sears' Invention. Following this filing, Sears continued diligently to pursue the Wood/Hartley invention. On December 11, 1998, Bodycote reported the first results of the laboratory tests directed by Robert Hartley. The testing showed a startling, then-unknown synergism of improved freezing point depression when $MgCl_2$ is mixed with certain organic materials. Robert Hartley hypothesized – correctly, as it turned out – that the organic constituents responsible for that synergism were low molecular weight carbohydrates (*i.e.*, sugars), identified in the tests as "Fraction E." This discovery of a synergistic effect between identifiable components was new to the deicing industry and indeed to the entire scientific community.

15. Sears' 1999 Patent Application. On January 4, 1999, Sears applied for a utility patent, Serial No. 09/224,906, describing essentially the same invention as in its provisional application, but adding new scientific data in support of the claims therein with respect to the freezing point depressant capabilities of sugars mixed with $MgCl_2$. The products were not residues, but sources having predictable, consistent characteristics. For thickeners, the application identified different formulations with suitably low freezing points, including corn syrup. These sugary substances had some of the lower freezing points of all the thickeners listed. Over the next two years, Sears, through Bodycote, conducted additional tests which further illuminated the invention. As mandated by statute, Application Serial No. 09/224,906 was held in confidence by the United States Patent Office, and Sears did not publicly disclose the subject matter thereof to any party.

16. Issuance of the '793 Patent. On October 9, 2001, the United States Patent Office issued United States Patent No. 6,299,793 ("the '793 Patent"), entitled "Deicing Solution," to Sears Petroleum, and Sears Petroleum and Seaco now jointly own the '793 Patent. The '793

Patent is a continuation-in-part of the parent application Serial No. 09/224,906, now abandoned. The '793 Patent essentially describes the same invention as the parent application, but with greater elaboration as to the molecular weight ranges for the carbohydrates in the freezing point depressant (Fraction E). Seaco sells deicing products utilizing the '793 Patent under the trademark ICE B'GONE® II.

17. Issuance of the '622 Patent. On June 24, 2003, the United States Patent Office issued United States Patent No. 6,582,622 (the "'622 Patent"), entitled "De-icing Solution," to Sears Petroleum, and Sears Petroleum and Seaco now jointly own the '622 Patent. The '622 Patent is a continuation-in-part of Serial Nos. 10/212,318 and 10/212,319, which are both a continuation-in-part of Serial Nos. 09/971,163 and 09/971,165, which are both a continuation-in-part of U.S. Ser. No. 09/755,587 (the '793 Patent).

18. Sears' Correspondence with MCP. On October 12, 2001, Sears' patent counsel Owen Marjama, who had learned that the "Caliber" brand of deicing products contained an aqueous solution composed of $MgCl_2$ admixed with corn syrup, sent a letter to MCP advising it of the issuance of the '793 Patent. The letter stated Sears' belief that one or more such products may be covered by the '793 Patent, and asked MCP to have its "technical people review the patent and advise" Sears on the matter. The basis for this inquiry was Sears' understanding that corn syrup is composed chiefly of sugars (glucose, fructose and sucrose), which in turn are low molecular weight carbohydrates within the range cited in the '793 Patent. On October 30, 2001, MCP's patent counsel, Joseph Bennett, wrote back to Mr. Marjama. In his letter, Mr. Bennett stated, without explanation, that "[t]he '793 patent claims simply do not cover deicing and/or anti-icing formulations sold or offered for sale by GT and/or the '793 patents are invalid," and that MCP had additional rights under a pending patent application.

19. MCP's Patent And Trademark. On October 22, 2002, the United States Patent Office issued United States Patent No. 6,468,442 ("the '442 Patent"), based on Serial No. 01/025,210, filed by MCP on December 19, 2001. The inventor listed on the '442 Patent is Stephen Bytnar, who had been involved in the sale of the residue products by the joint venture between Sears and Ice Ban America, Inc. from 1997 through early 1999. The '442 Patent describes various liquid deicer compositions (including, *inter alia*, an admixture of corn syrup, $MgCl_2$ and a corrosion inhibitor) covered by the claims of the '793 and '622 Patents issued to Sears Petroleum. MCP also obtained a federal registration, U.S. Trademark Registration No. 2,436,738 ("the '738 Trademark"), for the trademark "Caliber," for use in connection with "deicing preparations for use on roads and other outdoor surfaces."

20. Proposed Licensing of '793 Patent. Following the initial exchange of correspondence between patent counsel for Sears and MCP/GT in late 2001, GT proposed that Sears and it jointly market Seaco's ICE B'GONE® II and GT's "Caliber" brands of deicing products throughout North America under a license to the '793 Patent. Discussions to that end were held, both telephonically and in-person, between Sears and GT. At all points during those discussions, participants on behalf of GT were MCP (later ADM) employees, and included discussions held at MCP's (later ADM's) offices. By the Summer of 2002, GT and Sears had nearly finalized their arrangements for this joint venture and, in reliance thereon (and on the planned royalty payments), Sears agreed to allow GT to store and distribute "Caliber" products from Sears Petroleum's Albany, New York terminal. Also in reliance on the imminent joint venture, and believing that government approval for use of the "Caliber" product would inure to Sears' benefit, Sears did not seek government approval for use of its own ICE B'GONE® II product in certain states. In yet further reliance on the anticipated joint venture, Sears initially

did not object to GT using Seaco's own distributor, IMUS, Inc., to sell "Caliber" products in New York in conjunction with Seaco's own products.

21. ADM's Acquisition of MCP. In September 2002, ADM acquired MCP, which, together with METSS Corp. (through MLI), controlled GT. Upon information and belief, the '442 Patent and the '738 Trademark were assigned, as part of the merger between MCP and ADM, to ADM and, upon information and belief, ADM expressly or impliedly licensed GT to sell products covered by the '442 Patent under the '738 Trademark. The resulting management changeover stalled the execution of an agreement between the parties for a few months, but in December 2002, ADM provided Sears with assurances that it still wished to go forward with the deal. These assurances, and some informal business discussions, continued through the Spring of 2003, causing Sears to continue to permit the competing "Caliber" brand deicing products to be sold by Seaco's distributor out of Sears Petroleum's terminal. ADM exploited this opportunity to strengthen and expand the market for "Caliber" at the expense of Seaco's product lines.

22. ADM's Attempted Interference Action. In May 2003, during the course of these ongoing business discussions, Sears learned that, in September 2002, MCP -- while it had been representing that it was negotiating with Sears in good faith -- had secretly filed an application with the United States Patent Office, in an attempt to provoke an interference with Sears Petroleum's '793 Patent, based on its '442 Patent "invented" by Stephen Bytnar. As the application was commenced within one day of ADM's acquisition of MCP, Sears believes it to have been filed at the behest of ADM. One year later, the Patent Office's Board of Interferences, to date, has declined to act on MCP's / ADM's request to declare an interference.

23. ADM Moves Into Sears' New England Market. Notwithstanding ADM's attempted interference action, ADM continued to assure Sears, throughout the Summer of 2003, that it remained interested in pursuing a joint marketing arrangement with Sears for the 2003/2004 snow and ice season. Such prospective cooperation, however, was ended in September 2003 when Sears discovered that ADM revealed plans to sell "Caliber" product into New England, one of Sears' principal markets. Based on discussions with its distributor, Sears learned that ADM intended to go forward marketing its "Caliber" products nationwide without any license from Sears for the use of the invention disclosed in the '793 Patent.

COUNT ONE:
INFRINGEMENT OF THE '793 PATENT

24. Sears realleges paragraphs 1 through 23 as if fully set forth herein.

25. On October 9, 2001, the '793 Patent was duly, validly, and legally issued in the names of David H. Wood and Robert A. Hartley. All right, title, and interest in the '793 Patent was assigned to Sears Petroleum,and subsequently, Sears Petroleum and Seaco became joint owners of the '793 Patent.

26. Seaco sells a commercial deicing solution within the scope of the claims of the '793 Patent.

27. Defendants manufacture, offer for sale, and sell a line of commercial deicing products under the "Caliber" brand. Defendants have sold and continue to sell their line of "Caliber" brand deicing products throughout the United States for application to road surfaces or to "pre-wet" rock salt. Defendants' "Caliber" brand deicing products and their uses are within the scope of the claims of, and infringe, the '793 Patent.

28. Defendants have infringed and are continuing to infringe the '793 Patent.

29. Defendants have induced or contributed to, and are continuing to induce or

contribute to, the infringement by others, of the '793 Patent.

30. Defendants have had actual notice of the '793 Patent since at least October, 2001.

31. Defendants' infringement of the '793 Patent has been, and continues to be, deliberate and willful.

32. Defendants' conduct has caused and, unless enjoined, will continue to cause, irreparable harm to Sears.

COUNT TWO:
INFRINGEMENT OF THE '622 PATENT

33. Sears realleges paragraphs 1 through 32 as if fully set forth herein.

34. On June 24, 2003, the '622 Patent was duly, validly, and legally issued in the names of David H. Wood and Robert A. Hartley. The '622 Patent was assigned to Sears Petroleum, and subsequently, Sears Petroleum and Seaco became joint owners of the '622 Patent.

35. Seaco sells a commercial deicing solution within the scope of the claims of the '622 Patent.

36. Defendants manufacture and sell a line of commercial deicing products under the "Caliber" brand. Defendants have sold and continue to sell their line of "Caliber" brand deicing products throughout the United States for application to road surfaces or to "pre-wet" rock salt. Defendants' "Caliber" brand deicing products and their uses are within the scope of the claims of, and infringe, the '622 Patent.

37. Defendants have infringed and are continuing to infringe the '622 Patent.

38. Defendants have induced or contributed to, and are continuing to induce or contribute to, the infringement by others, of the '622 Patent.

39. Defendants have had either actual or constructive notice of the '622 Patent since at least June, 2003.

40. Defendants' infringement of the '622 Patent has been, and continues to be, deliberate and willful.

41. Defendants' conduct has caused and, unless enjoined, will continue to cause, irreparable harm to Sears.

WHEREFORE, Sears demands:

(1) as for Count One: (a) entry of judgment that Defendants infringe the '793 Patent; (b) an injunction against Defendants under 35 U.S.C. § 283, to stop infringement of the '793 Patent; (c) an award of damages against Defendants adequate to compensate Sears for the infringement of the '793 Patent, trebled to compensate for willfulness of the infringement, pursuant to 35 U.S.C. § 284; (d) interest thereon; (e) a judgment deeming this to be an exceptional case within the meaning of 35 U.S.C. § 285, entitling Defendants to an award of costs, reasonable attorney's fees, and expenses incurred in this action; and (f) such other and further relief as the Court may deem just and proper; and

(2) as for Count Two: (a) entry of judgment that Defendants infringe the '622 Patent; (b) an injunction against Defendants under 35 U.S.C. § 283, to stop infringement of the '622 Patent; (c) an award of damages against Defendants adequate to compensate Sears for the infringement of the '622 Patent, trebled to compensate for willfulness of the infringement, pursuant to 35 U.S.C. § 284; (d) interest thereon; (e) a judgment deeming this to be an exceptional case within the meaning of 35 U.S.C. § 285, entitling Defendants to an award of costs, reasonable attorney's fees, and expenses incurred in this action; and (f) such other and further relief as the Court may deem just and proper.

(continued on next page)

Dated: November 3, 2003

SEARS PETROLEUM & TRANSPORT CORP.
SEARS ECOLOGICAL APPLICATONS CO. LLC
By their attorneys,

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DEMAND FOR JURY TRIAL

Plaintiffs hereby demand trial by jury for all the issues so triable.

Indranil Mukerji, Esq.
Federal Bar Roll No. 511,738

CERTIFICATE OF SERVICE

The undersigned hereby certifies that on the 3rd day of November, 2003 true and correct copies of the foregoing First Amended Complaint were served by first class mail, postage prepaid, on the following:

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IN THE UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF NEW YORK

Civil Action No. 03-CV-530(DEP)

CARGILL, INCORPORATED,

Plaintiff,

v.

SEARS PETROLEUM & TRANSPORT CORPORATION,

Defendant.

VIDEOTAPE DEPOSITION OF: STEPHEN C. BYTNAR
September 25, 2003

PURSUANT TO NOTICE AND SUBPOENA, the videotape deposition of STEPHEN C. BYTNAR was taken on behalf of the Plaintiff at 1140 38th Avenue, Suite 1, Greeley, Colorado 80634, on September 25, 2003, at 1:20 p.m., before Carol M. Bazzanella, Registered Professional Reporter and Notary Public within Colorado.

A P P E A R A N C E S

For the Plaintiff:	RENEE L. JACKSON, ESQ. Fulbright & Jaworski L.L.P. 225 South Sixth Street, Suite 4850 Minneapolis, Minnesota 55402-4320
For the Defendant:	JOHN DELLAPORTAS, ESQ. Duane Morris LLP 380 Lexington Avenue New York, New York 10168
For the Deponent:	CHARLES B. DICKSON, ESQ. EnviroTech Services, Inc. 1140 38th Avenue, Suite 1 Greeley, Colorado 80634
Also Present:	Scott T. Piering, Esq. Jay R. Wren, Videographer

I N D E X

WHEREUPON, the following proceedings were taken pursuant to the Federal Rules of Civil Procedure.

* * * * *

THE VIDEOGRAPHER: The time is 1:20. We're on the record. This is the deposition of Stephen C. Bytnar, taken in the -- by the plaintiff in the matter of Cargill, Inc., versus Sears Petroleum & Transportation Corporation, Case No. 03-CV-530 in the U.S. District Court, Northern District of New York. The deposition is being held at 1140 38th Avenue, Suite 1, Greeley, Colorado. Today is September 25, 2003. The reporter is Carol Bazzanella. I am Jay R. Wren, CLVS, the videographer. We are both from the firm of Benchmark Reporting Agency in Minneapolis, Minnesota.

Counsel will now introduce themselves, beginning with the attorney on the left and the deponent's immediate

right.
MR. DICKSON: Charles Dickson. I'm in-house counsel for EnviroTech Services, Inc. I appear with our employee, Stephen Bytnar.
MR. DELLAPORTAS: John Dellaportas, law firm of Duane Morris LLP in New York. I'm here on behalf of Sears Petroleum & Transport Corp and Seaco, LLC.
MS. JACKSON: I'm Renee Jackson. I'm from the law firm of Fulbright & Jaworski. I'm based in Minneapolis, Minnesota. I'm here on behalf of the plaintiff in this matter, Cargill, Incorporated, and with me today is Scott Piering, P-i-e-r-i-n-g, who's in-house counsel at Cargill, Incorporated.
THE VIDEOGRAPHER: The reporter will now swear in the witness.
STEPHEN C. BYTNAR,
having been first duly sworn to state the whole truth, testified as follows:
EXAMINATION
BY MS. JACKSON:
Q Please state your full name for the record, sir.
A Stephen Craig Bytnar.
Q And what was the middle name?
A Craig.
Q Craig. Okay. And what is your business address, sir?
A The business address is 1140 38th Avenue, Suite 1, Greeley, Colorado 80634.
Q And your home address, sir?
A 277 North 60th Avenue, Greeley, Colorado 80634.
Q By whom are you currently employed?
A EnviroTech Services, Inc.
Q And are you attending this deposition today because you've been subpoenaed to come here?
A Yes, I am.
Q Have you been deposed before, sir?
A Yes, I have.
Q How many times?
A Once.
Q And how long ago was that?
A About four years ago.
Q Okay. So you may generally recall how it went, but I want to sort of lay down some rules for how we'll proceed here today so that we can proceed efficiently and effectively. First, please make sure I've finished my question before you start your answer. And it's different from normal conversation, because we do that all the time. But the court reporter needs to type in the words. She obviously can only type one word at a time. And the video will need to be audible, so people can hear one of us talking at one time. So I think we're already beginning to do that a little bit today, but if we'd just kind of relax a little bit, let me finish my question, you answer, I'll let you finish your answer, and I'll ask the next question. Okay?
A Okay.
Q Sometimes people think when they go quicker at depositions, the depos should go quicker, but, actually, the more we take our time and answer slowly, that actually the quicker it goes.
A Okay.
Q Also, please be sure to answer with real words, not noddings of the head or uh-huh or huh-uh, as, again, when we look at the record later on, it's hard to tell what you

really said. Okay?
A Okay.
Q And if there comes a point in the deposition, after a question's been answered, when you feel like you need a break, definitely ask. We're very accommodating. We don't want this to be a test of your physical stamina, just an opportunity to ask you some questions here today. So if you need a break, please feel free, and we'll take a break.
A I'll do that.
Q Thank you. You said you were employed or are employed by EnviroTech Services, Inc. How long have you been employed by EnviroTech Services, Inc., sir?
A Just over a year.
Q And what is your position with EnviroTech Services, Inc.?
A I am the marketing director.
Q Are you the marketing director over all products at EnviroTech or just certain products?
A All products.
Q Okay. And, generally, what are the products at EnviroTech?
A Our base and core products involve highway de-icing products. There are a multitude of those, as well as road stabilization and dust control products, of which there are multiple as well.
Q And if you could describe a little bit more particularly, what are your duties and responsibilities as marketing director for EnviroTech?
A My duties and responsibilities involve the development and oversight of a corporate marketing plan, marketing and sales plan, which involves how we will promote, market and sell all de-icing products across all markets with input into pricing and those issues.
Q Do you, yourself, sell EnviroTech highway de-icing products?
A I am not considered a salesman.
Q Do you oversee the salespeople for EnviroTech?
A No. We have a separate sales manager.
Q And who is that?
A Eric Niemann.
Q How do you spell his name?
A N-i-e-m-a-n-n.
Q What highway de-icing products does EnviroTech currently sell, sir?
A We sell magnesium chloride under a trademark MeltDown. We sell the Caliber products that we distribute for Glacial Technologies. The non-chloride product through Glacial Technologies. We sell a granular product and variations thereof called Ice Slicer. And --
MR. DICKSON: MineralMelt.
THE DEPONENT: What's that?
MR. DICKSON: MineralMelt.
A MineralMelt, another granular product. And then various packaged products, all granular.
Q (BY MS. JACKSON) And, generally, what kind of customers, in your experience, does EnviroTech sell the magnesium chloride product to currently?
A The vast majority of our customers for all of our products are government agencies; state DOTs, counties, municipalities. We do sell some commercial.
Q So the same is true for the Caliber product?
A Yes.
Q You said that EnviroTech distributes the Caliber

product for Glacial Technologies. Can you explain who -- who Glacial Technologies is?

A Glacial Technologies is a joint venture company between now Archer Daniels Midland and Metz Corporation. The joint venture was formed when Minnesota Corn Processors was in existence, where MCP had certain intellectual property and manufacturing capabilities, Metz had intellectual property and research and -- and development capabilities. The two companies come together to form a joint venture company for manufacture and -- and production of intellectual or patented de-icing products.

Q You said that the joint venture known as Glacial Technologies was formed when MCP was not owned by ADM, right, sir?

A Is that correct.

Q Okay. Do you know approximately when that joint venture was created?

A I should have this date memorized, as I was very involved in the formation of the joint venture. It was going to be July of 2001, to the best of my recollection. It's going to be somewhere close to that. The negotiations took several months, so the actual closing date is sometimes hard to recall.

Q Okay. And does EnviroTech have any particular geographic region or limitations on where or how it distributes the Caliber product for Glacial Technologies?

A We have the largest portion of North America. There are some states in the Ohio River Valley, Ohio, Indiana, Michigan -- let's see, Ohio, Indiana, Michigan, Tennessee, Kentucky and West Virginia that we are prohibited from selling the products.

Q So the continental United States except for those regions you mentioned?

A Yes. Plus Canada.

Q Okay. So then how many salespeople does EnviroTech have to distribute specifically the Caliber product?

A Direct sales that are employed directly by us, I believe that number is ten. When you add in our subdealers and distributors and our -- and folks that -- that sell the products for us and through us, that number gets closer to 30.

Q Do you know who, either what person or what company, distributes the Caliber product for EnviroTech in the New York state region?

A Imus.

Q I-m-u-s?

A Yes, I-m-u-s.

Q What about in the northeastern United States? Is there another distributor for EnviroTech of the Caliber product?

A At this point, Imus is -- is supposed to be marketing and selling up there as well, but to date, they haven't had a lot of success, but they are our marketing arm in that part of the country currently as well.

Q Do you know, sir, whether there was a distributor for the Caliber product for EnviroTech in the New York state region at some time before Imus?

A There were distributors for the Caliber product, not through EnviroTech. There had previously been -- in fact, I had named the distributor in my days at Glacial Technologies, called SWP Environmental. They were the sole distributor for the state of New York. Then, before I left Glacial Technologies, for nonperformance their distribution

agreement was terminated, at which point EnviroTech was given the opportunities in New York.

Q And then EnviroTech turned those opportunities over to Imus?

A Yes.

Q How about in the northeastern region, has there been a distributor of Caliber, to your knowledge, before Imus?

A No.

Q You said, I think, what your responsibilities are as marketing director of EnviroTech. Can you describe a little bit more specifically how you go about fulfilling those responsibilities for EnviroTech?

A We go out and we -- we locate potential distributors for areas that we do not have direct sales. We locate those distributors. We train and assist them in the products, how to use the products, how to sell the products. In addition to finding distributors, it's part of my job duties, is I will also travel out to help train our direct customers on how to use the products, when to use the products, the tech -- the technology advancements in using the products. Much an educator of sorts.

Q So do you do a fair bit of traveling throughout the United States in connection with your job for EnviroTech?

A Yes.

Q Well, you brought up education, so why don't we go there. Where did you attend high school, sir?

A I attended high school in Mountain View, Wyoming.

Q And did you attend college?

A Yes, I did.

Q Where did you attend college?

A Dakota State University in Madison, South Dakota.

Q And did you obtain a four-year degree from college?

A I have a bachelor's degree titled biology for information systems.

Q In that degree, was there a certain concentration of studies of a certain type you can describe?

A Yes. Emphasis on biology and chemistry, and then business administration and computer programming. A very diverse degree.

Q Sounds like it all comes in handy in your current job?

A All except for the computer programming.

Q So did you have more than one college chemistry course there?

A Multiple. To the best of my recollection, I remember taking at least three 400-level chemistry courses. So at least 12 chemistry courses had to be taken.

Q Did you have any minor subject of study?

A I believe there are enough credits there to constitute a chemistry minor, but because of the way they structured it within the information systems degree, they don't list it as a minor.

Q And subsequent to obtaining that degree, have you had any other formal education?

A No.

Q After obtaining that degree, where did you go to work?

A I went to work for Minnesota Corn Processors in Marshall, Minnesota. I began as an intern while I was finishing my -- my last few classes. Upon graduation, I immediately went to work full time as a laboratory technician.

Q And did you work with any particular kind of products as a lab technician?

A Through my progression, started as a shift technician, where we monitored hourly the quality control of all aspects of corn wet milling, from the corn itself to the finished products, including all of the coproducts and wastewater analysis, et cetera. That was as a laboratory technician. I was then promoted to quality assurance representative, where we dealt with the same materials, we just went more in depth in what -- in how we -- in how we tested them.

Q If I could just stop you there. You said you worked with finished products, and I didn't understand what one of the words you said was, core or Coke or corn?

A Based from -- from the corn feedstock all the way through to the finished products, which would be corn syrups, cornstarches, gluten meals, corn germ.

Q I'm told it was coproducts that you said?

A Coproducts, yes.

Q Can you explain what a coproduct is?

A A coproduct is -- by the classical definition, a coproduct would be a product that is produced through the manufacture of your main process, but it's not necessarily the intended purpose of the process. For example, when you -- when you're wet milling corn, your intent is is to get at the starch, which you can then turn into syrup, et cetera. There are several coproducts that emerge from that, being feed products and gluten meal and germ, which come out of the process, but they are not the intended product of the process. But you still have markets that you sell them into.

Q When did you graduate from high school, sir?

A 1988.

Q And when did you obtain your bachelor's degree?

A The diploma was official in May of 1992.

Q But you said you began with Minnesota Corn Processors before May of 1992?

A December of 1991.

Q Okay. And you said you began as a lab technician, and then you said you were promoted to a quality assurance representative, right, sir?

A Yes.

Q Okay. And when, as best you can recall, were you promoted?

A Late 1993.

Q And, again, if you could just describe your responsibilities as the quality assurance representative.

A We -- we oversaw management of the laboratory. We made sure that instruments were calibrated and running correctly, and ran more advanced testing procedures than would a normal laboratory technician. More in depth, more difficult type of testing.

Q And all this on corn products?

A Yes.

Q Did you then grow into another position with Minnesota Corn Processors?

A Around mid-1994, I was promoted as a technical service representative, where my focus was to travel around to our cornstarch customers, specifically corrugated box plants, as cornstarch is the primary ingredient in -- in the glue that holds cardboard boxes together. I was -- I called myself a fireman. When they called and they were having trouble, I was on a plane the next afternoon.

Q What kind of trouble do corrugated box customers

have?

A They mess up their glue formulas, and the boxes start falling apart. So then I would go out and reformulate for them and move on.

Q Did you grow into another position with Minnesota Corn Processors?

A That was an interesting evolution. As a technical service representative, at that time, from a -- from a technical background, MCP was not very deep, and whenever the receptionist would end up with a phone call that she didn't know who to send to, I ended up getting it, and from that I got a phone call from a gentleman who was talking about de-icers and using a product that was similar to one that MCP would have had, and I went into the lab, starting playing around with those products, and over the course of the next couple three years, my job became 100 percent de-icing in nature.

Q So you said you got a phone call related to de-icers. When, to the best you can recall, was that?

A That was going to be sometime around mid-to-late 1995, I believe. Again, I'm a little sketchy on some of those dates, but I received a call from a gentleman named George Janke, who was with Ice Ban America, and he was speaking to me about a product -- a coproduct that we manufactured that we called stillage or distiller solubles. It was the residue of ethanol production.

Q And you said that this would be a product -- the product that Mr. Janke was talking about would be a product that you said would be similar to something that Minnesota Corn Processors would have?

A He said he had a patent for a product that was similar to ours, referring to the distillers, solubles.

Q Okay.

A He was referring specifically to a patent that he had claimed to own out of Hungary as the Toth patent.

Q And why was Mr. Janke calling you?

A He was looking -- he was looking for a supply and for a company that was technically sound enough to be able to help them develop the product. And as a farmer-owned co-op, he felt that we were fairly safe.

Q Is the distiller -- distiller solubles product you're referring to sometimes referred to as DCS?

A Yes.

Q So did you, at Minnesota Corn Processors, then begin working with Mr. Janke?

A Yeah. I took it on almost as a pet project. On the slow afternoons, I would go down to the lab and play around with it, see what we could get it to do, see if we thought it had any efficacy as a highway de-icing -- as a highway de-icer. I started doing a great deal of research on -- on, you know, what projects highway de-icers needed, those sorts of things, and just began developing the product and seeing if we could turn it into a viable product at -- at much the -- the entertainment of a few people at MCP. They were rather entertained that I was going to try to turn this into a highway de-icer and apply it to the roadway.

Q Did MCP begin supplying Mr. Janke at Ice Ban America with any product?

A Yes, we did. Over the course of the next six months or so, we developed a product that we felt was -- was actually a fairly decent product. There was nothing else like it in the industry. We ended up mixing it with -- with some current de-icing products such as magnesium chloride.

As we began to mix them together, it started to show potential. We thought it was something maybe we would want to pursue.

At that time, Minnesota Corn Processors was going through a rather substantial plant expansion. Our product streams had changed somewhat. No longer did we have what we called distiller solubles separate from what then we referred to as steepwater, which is another coproduct that comes from the front end of the process, in the steeping of the corn. They're fairly similar in their appearance, and they have a slightly different odor, but the molecular composition is -- is actually fairly different, and we ended up combining those two.

I ended up testing steepwater separate. In my young days, in my naivete, I provided all of the data that I had tested for the steepwater to Mr. Janke at Ice Ban America, and subsequently a patent was produced with his name listed as the inventor. But we were -- we were entering into a business relationship with them. We felt that it was fairly viable. At one point, Minnesota Corn Processors had a -- a contract where we were buying into Ice Ban America. They had gone public, and we were trading product for stock. Every other shipment that went, they paid -- they paid for. The loads that were not paid for, they paid us for stock -- or paid us with stock in the company.

Q Okay. That's when -- can I go a little -- I appreciate your story very much, and I want to just go back to it and put some time frames on the various stages that you talked about. So you said you got a telephone call from Mr. Janke of Ice Ban mid-to-late 1995?

A Right.

Q And then you began working with the type of product, the DCS product that he was asking for?

A That took about six months, to really work through and get a product we felt good about.

Q So by mid-1996 or so, you believe Minnesota Corn Processors was providing Ice Ban with a DCS product?

A Yeah. You know, you could obtain that exact date simply by going back and requesting a -- the first invoice from Minnesota Corn Processors to Ice Ban America. That would give you the exact date.

Q And at this point, I'm just kind of interested in general time frames, just so we understand where we are.

A And then it was subsequent after that that we entered into a contract with them to buy into the company.

Q Okay. Another development you said was you began testing the steepwater?

A Uh-huh. That was in that six-month time window --

Q Also?

A -- that we began testing the steepwater, yes.

Q Did Minnesota Corn Processors ever provide Ice Ban with steepwater?

A Yes. What ended up happening was we were providing a mixed product for a period of time, and this -- this is where -- there was a fairly convoluted time frame there, where Ice Ban and Sears and Innovative/Imus were all working together. Subsequently, somewhere in that time frame Mr. Sears took a -- took a trip to Hungary. He determined that Mr. Janke had misrepresented the fact that he did not own the Toth patent. Mr. Sears bought the Toth patent, returned to the States and basically went out on his own.

Once MCP determined that Mr. Janke didn't have the Toth patent, we -- we discerned that it probably was not safe

for us to sell stillage to Ice Ban America through the violation of the Toth patent, so we went back into our process and re-separated steepwater from stillage so that we were able to supply just steepwater to Ice Ban America. So the vast majority of the product that we supplied to Ice Ban America was, in fact, steepwater.

Q So, again, we went to mid-1996 or so, when MCP began supplying the DCS and the steepwater to Ice Ban America. When, thereafter, do you believe that this contract was entered into between the two companies? As best you can recall.

A Early 1997. Again, you could obtain the records to that effect. They exist somewhere at -- at -- in Decatur, Illinois, as they, I believe, transferred all the records from Marshall.

THE VIDEOGRAPHER: Sir.

Q (BY MS. JACKSON) You said that you -- after getting the phone call from Mr. Janke, you began doing research on properties needed for an effective de-icing product.

A Uh-huh.

Q What properties did you determine in that research period were needed?

A There are a number of properties that are key for -- for highway de-icing. One is -- the foremost is is whatever you're going to use must be water-soluble. Anything that is not water-soluble will not melt snow and ice. We started looking at the properties of corrosion, how to reduce corrosion, what it took to reduce corrosion, freezing point suppression, what we could do to lower the freezing point suppression.

And, also, most people equate freezing point suppression with melting capacity. They're not the same. You can do things to affect the melting capacity of a product without changing the freeze point suppression. How the products lay on the road, better ways to keep them on the road, application, purification, trying to remove things that you don't necessarily want in the de-icing product, working on those types of things.

Q You said that freeze point depression is not the same as ability to melt?

A That's correct.

Q Okay. In your experience, if something does have freeze point depressive qualities, does that necessarily mean that it will melt ice?

A Anything that is soluble in water will melt ice. The question is, is how much ice will it melt? It is conceivable, and I did it once in the lab, to create a product that has a very low freeze point. However, if you spit in it, it will refreeze, because it doesn't have -- it doesn't have the properties required to melt significant amounts of snow and ice. A slight amount of -- of moisture introduced, and the product will refreeze again.

Q And you've said "we" in terms of who has been working in the -- who was working in the Minnesota Corn Processor plant. Was there actually anyone besides yourself?

A No. And whenever I said we, it was -- I was always a company team player, so -- but I would tell you that when I was at Minnesota Corn Processors, this was my pet project, and I was very fortunate that the company just turned me loose, kept paying my salary, and told me, If it works out great; if it doesn't, you got an education.

Q Did Ice -- or Minnesota Corn Process -- Corn

Processors ever, in any formal way, lend your services to Ice Ban, or was it purely informal?

A That was part of -- it was all informal in the beginning. As a farmer-owned co-op, the -- the big buzz word at that time was always diversification. They loved the idea of getting into something they weren't into before. It used corn, it was friendly to the environment, so they were just paying my salary, allowing me to do this. At the same time that we entered into the formal agreement with Ice Ban America, part of that agreement was listed that 100 percent of my time would be dedicated to Ice Ban America.

Q And that, your best estimate, was around early 1997?

A Yes.

Q And at what point did that formal relationship between Minnesota Corn Processors and Ice Ban come to a stop?

A Formally, it ended in June of 1999. But it had been strenuous for a year prior to that.

Q Okay. So, again, you said you got the telephone call from Mr. Janke in mid-to-late 1995. From that point, through the next six months, where you researched what you've described, how much of your time, your working hours, would you say was spent towards the Ice Ban pursuits?

A 25 percent.

Q And then is there any change in that percentage of your working hours from, again, the mid-1996 period until early 1997, when the more formal relationship began?

A It was progressively becoming more and more of my job. By -- by early 1997, it was probably -- or by -- excuse me, by -- by mid-'96 it was probably 75 percent of my time or more.

Q And during this time, '95, '96, when you still had duties for Minnesota Corn Processors, what were they?

A They were continuing to do the technical service for the starch corrugated customers.

Q But then by early 1997, when this formal relationship began, a hundred percent of your time for Minnesota Corn Processors was spent for the pursuits of Ice Ban?

A Yes. MCP had hired an individual as a salesperson who had technical service experience in corrugating, specifically so I would have time freed up to pursue the anti-icing business.

Q And you said the relationship between the parties became strained by mid-1998?

A Yes.

Q At what point did you begin not spending a hundred percent of your working time for the Ice Ban pursuits?

A Not till July of '99. Or June of '99. At whatever date we filed the lawsuit against Ice Ban America, up until that date, I had a hundred percent of my time dedicated.

Q So you've described the period, again, from mid-to-late 1995, for the following six months, when you researched and developed the DCS product and the steepwater product to provide to Ice Ban. After that point, can you describe what you did for the Ice Ban products?

A For the majority of the time, I was considered their technical advisor. Whenever there were questions about how the products worked, what we had to do for quality control, ways in which to improve the products, those sorts of things, that's what I did. I traveled the country extensively and educated and promoted the product based on the performance values and the properties and the attributes

that the products had.
Q Did you test the Ice Ban products?
A More times than I care to admit.
Q Did you assist in creation of informational materials for the Ice Ban product about what was in the product?
A I created those materials.
Q Besides the sort of informational materials about what's in the Ice -- what was in the Ice Ban product, did you have any role in creating marketing materials for the Ice Ban products?
A I created all of those as well.
Q Who were your primary people that you worked with on -- at the Ice Ban company?
A A gentleman by the name of George Janke, who was the president, and then at that time the vice president, Jeff Johnson.
Q Did you physically work from your Minnesota Corn Processors office?
A Yes, I did.
Q Did you travel to meet with Mr. Janke and Mr. Johnson?
A Yes, I did. On multiple occasions I would go to West Palm Beach, Florida, or to New York to meet.
Q I assume Mr. Janke was in West Palm and Mr. Johnson was in New York?
A Yes. I'm trying to remember the name of this -- the town in New York, but it -- it's near Rochester. Can't recall the name of the town right off the top of my head. It's a small town just outside of Rochester.
Q Lyndonville?
A There you are. That's the one.
Q During the time when you worked on behalf of MCP with the Ice Ban folks, did you work with Ice Ban to improve its product -- improve its product?
A Yes.
Q Can you just describe improvements made in the product during that time?
A One of the big improvements we had to make was we worked extensively on new filtration systems and ways to improve the process and the production to remove foreign material, as one of the applications for the products is what we call anti-icing, or direct spray of the liquid onto the roadway. As a coproduct, its -- it was never -- there was never much care given to the manufacture. It was inconsistent and inherently contained vast amounts of foreign material that would plug nozzles, et cetera. And one of the big pushes we had to do was -- was trying to improve the quality.

I spent almost a year discussing with government agencies the issue of phosphorous and corrosion inhibitors and the difference between soluble phosphorous and nonsoluble phosphorous, and which types of phosphorous the products contained and why they weren't harmful for the environment, where other types were.
Q In terms of the filtration and gaining control of the foreign material in the product, can you place any time, and by year, when you believe that the Ice Ban product did have that quality control?
A The filtration units were probably finished in 1998, mid to the end of '98, maybe. It was a long and arduous process. This is not easy material to work with. And it was a continuous, ongoing process for -- it probably

went on for 24 months. Right up to the very end, we always struggled to keep control and to be consistent.
Q But it was improving?
A Yes. By the time we were done, we were told by everyone in the cattle feed industry, which is the primary use for steepwater and stillage, that we had the best-looking product in the -- in the industry. Unfortunately, they weren't willing to pay more for it.
Q You said when you were researching in late 1995, or early 1996, you mixed the DCS with magnesium chloride, right, sir?
A Yes.
Q Okay. Do you recall what led you to do that?
A In my research in current de-icers that were out there, I looked into -- I was testing and trying to melt snow and ice with the DCS product, having a mixed bag of results. Jeff Johnson in New York had been actually coating salt with the material. I looked into -- we wanted to focus a lot on using the material as a -- as a liquid for anti-icing. The next logical step, knowing that he was mixing it with salt, rock salt, solid salt, having good -- having good success, was to look at, well, if it mixes with rock salt, will it mix with the other de-icers out there.
Quick research showed that mag chloride was that product. Started mixing with mag chloride, had some pretty good results. Very soon after that, met with Dale Keep of the Washington State Department of Transportation. Mr. Janke had sent him a sample of the raw stillage. He had come to the same conclusion that I had. The first thing he did was pour it on ice. It didn't do much. He mixed it with magnesium chloride and got very similar results to what I did.
Q In what performance characteristics?
A We got increases in eutectic point, not in just the steepwater, but -- or in the stillage, excuse me, at that time, but also in the magnesium chloride. There's a synergy that was taking place between the organic-based material and the magnesium chloride. We got corrosion numbers that were lower than that of water, and subsequently one of the environmental benefits was, is, obviously, if we were mixing it one to one with magnesium chloride, we were cutting the chloride load into the environment substantially.
Q Can you explain, in a summary, what you mean by eutectic point, sir?
A Eutectic -- excuse me. Eutectic point is the point at which a liquid solution remains 100 percent liquid, that there is no ice crystals forming, nor are there crystals of the solid -- solid substance that is dissolved in the liquid.
Q Does that relate to the point at which the liquid will freeze or will not freeze?
A Yes.
Q When, in connection with your work for Ice Ban, did you become familiar with the Imus Company?
A It was fairly early on. About the time -- about the time that we decided that MCP was going to move forward, which would have been about early-to-mid 1996 became my first real contact, subsequent contact with Jeff Johnson. I was aware of Mr. Johnson through conversations with Mr. Janke. But as the business relationship progressed, I was then introduced to Mr. Johnson, who was working in Lyndonville, New York, who had located Innovative in Toronto, and subsequently Imus, their -- their U.S. arm, and became aware that were going to be selling and marketing the product in

the New York area.
Q Did you subsequently work at all with Imus in terms of their role as selling and marketing the Ice Ban product in the New York area?
A Certainly. We attended multiple conferences of the group. We attended multiple meetings to discuss how it was going to be sold and marketed, to discuss the technical aspects of the product so the salespeople had ways in which they could promote and sell it.
Q At that point, around 1997, do you recall whether Ice Ban was sold simply alone or also to be mixed with magnesium chloride?
A There was -- there was only a very short time that it was ever sold or at least marketed aggressively as a product by itself. There were a few customers that Mr. Johnson had in New York that preferred to coat their salt with it alone, but 99-plus percent of the material that was ever sold and marketed had magnesium chloride in it.
Q Did there come a time when you become familiar with a company called Sears Petroleum in connection with your work with Ice Ban?
A Yes. It was some months after my introduction to Imus; it became apparent that they needed some terminals in New York to be able to throughput and blend the products to sell and market them efficiently. They located Sears through the Albany terminal and -- and approached Sears to -- to do the throughput. Sears was a gentleman that at that time knew that the oil business was struggling. He was looking to diversify himself, had some money to invest, decided he wanted to perhaps be a little bit more than just a throughput agent, wanted to be a distributor himself, formed a very good relationship with Mr. Baun of Innovative/Imus, and meetings were subsequently held to discuss a three-way partnership between Imus, Sears and Ice Ban for marketing, sale and distribution of the products in New York and New England.
Q So the best you can recall, is that sometime in 1997?
A Yes. Some -- somewhere in that time frame. It's -- I get sketchy on some of these time frames, they all blended together so quickly. I remember distinctly sitting in Mr. Johnson's residence in Lyndonville. My first, and until recently only, firsthand meeting with Mr. Sears was at a -- was at Mr. Johnson's house, where he held his offices, and the entire group got together, and we were going to discuss how we were going to sell and market and distribute the products. This was before Mr. Sears had gone over to Hungary and -- and purchased the Toth patent.
Q And during that meeting, you were present, obviously?
A Yes.
Q Who else from the Ice Ban side of things was present at that meeting?
A Mr. Janke and Mr. Johnson.
Q And who -- was someone from the Imus Company there?
A Greg Baun was there, and Darin Crawford.
Q And then from the Sears Petroleum side of things who was there?
A Howard Sears, Dave Wood. Ron Francis may or may not have been there, I can't recall.
Q And at that point, the Ice Ban folks had been in the de-icing business for a few years, right?
A Well, actively marketing and selling -- actively marketing and selling, maybe a year.

Q And Imus had been working with Ice Ban for that period too?

A Yes. Again, so you understand, some of these dates in my mind are approximate.

Q Sure.

A I can tell you exactly what happened. The exact dates at which some of these things took place are going to be somewhat flexible.

(Discussion off the record between Ms. Jackson and Mr. Piering.)

Q (BY MS. JACKSON) After the point when Sears Petroleum came into, as you say, joint venture with Ice -- Ice Ban and Imus, did you have occasion to work at all with the Sears Petroleum folks?

A First, you used the term "joint venture". I'm not sure the deal ever actually got done. What you need to understand is is that I focused on the technical end; Mr. Janke, at that time, occasionally brought me into the business end. I do know that when I sat in that meeting -- that meeting in Lyndonville, it was fairly tense at times. Mr. Janke and Mr. Sears never saw eye to eye. Mr. Sears wanted a much bigger role than Mr. Janke was prepared to give him.

Mr. Janke was an entrepreneur who was a little bit loose with the way he handled details. Mr. Sears didn't like that. I know that negotiations went on for some time. I'm trying to recall. I cannot tell you a hundred percent one way or the other whether the -- whether the joint venture was actually ever solidified and documented on paper. To my knowledge, I don't know that it was.

Q And by using those words, I -- I thought I was using yours, and I was not intending to imply one way or the other whether there was an actual deal signed or anything formal or anything actually agreed to.

A I know while the negotiations were going on, all three groups were working together unified as and a team. I didn't work a whole lot with the Sears folks. Most of my work was through Mr. Johnson, who dealt directly with the Sears folks. On occasion I would speak to someone at Sears, but not very often. And, again, they may or may not have gotten the joint venture done. If they did, I know it was for a short period, because it was very tenuous. At no point in there were we one big, happy family. I'll put it that way.

Q And then the -- the working relationship between those three companies, such as it was, ultimately came to an end, as best you can recall, approximately when?

A There were quite a few things that all came together and changed all at the same time. Late '98, maybe, was when everything, for the most part, officially blew up. Things weren't going well with Sears. Imus had a tight relationship with Sears, decided they were going to side with Sears on all issues. There was an internal issue with Mr. Johnson in regard to alleged statements on his behalf to stockholders of Ice Ban America, that they should sell their stock and buy into another company that his brother was repping, and at that point he was removed as vice president of the company.

That left a void in the business aspect of it, at which point I was basically drafted to become their vice president of sales and marketing. I can tell you that from my first day as vice president of sales and marketing, Sears and Imus were both considered to be the competition, and

never allies. So at some point prior to that, things officially dissolved and were over.
Q Okay. And by that point in late 1998, Mr. Howard Sears had already purchased the Toth patent, as you described, right?
A Yes. It was right in that timetable, because I think that was what officially dissolved any arrangement, official or otherwise, between the companies, was when he came back from Hungary and made the statement that he now owned the Toth patent. In fact, at that point, he filed a suit against Ice Ban America, and Mr. Janke specifically, for fraud, stating that they had owned the Toth patent.
MS. JACKSON: If you can mark this as 330.
(Deposition Exhibit 330 marked.)
THE DEPONENT: Would this be a good time for me to take a break?
MS. JACKSON: Yes, it would be, actually.
THE VIDEOGRAPHER: The time is 2:14. We're going off the record.
(Recess taken from 2:14 p.m. to 2:25 p.m.)
THE VIDEOGRAPHER: The time is 2:50 -- no, sorry, 2:26. We're back on the record.
Q (BY MS. JACKSON) I want to go back to a couple topics that we didn't quite wrap up before the break. I had asked about improvements that you assisted in making in the Ice Ban products from the time that you began working with them until the time you left, and you mentioned two specifically; one with respect to filtration and one with respect to phosphorous. Are there any other improvements that come to mind?
A Varying the blends of the amounts of the Ice Ban product with mag. Early on, the intent was to make it a one-to-one blend. The reason for that was for business purposes. Ice Ban didn't sell magnesium chloride, they sold Ice Ban. One of the things that I did as the technical advisor was teach them that making the most money doesn't present the best product, which inhibits volume. We worked on various blends of putting more magnesium chloride in, less Ice Ban. Gave us better melting performance, equal corrosion performance. Those were the primary aspects. Outside of cleaning the product, there really wasn't a lot you could do with that product. It was what it was.
Q And you said, again, you became familiar with the Sears Petroleum Company coming into the de-icing business with Ice Ban and Imus in around 1997. From that point, until the time you left, working with Ice Ban, from your perspective, how active was Mr. Howard -- Mr. Howard Sears in the de-icing business?
A To the best of my knowledge, he -- what they were was a functioning distributor in the New England area for their own product, which was the distiller solubles mixed with magnesium chloride. To this day, we've never seen them leave the New England area, try to market or sell any of their products. So for that entire time, right up until I had left Ice Ban, and even beyond, they were functioning as no more than a throughput and distribution terminal, and I think they hired a couple of their own salesmen up in New England to try and market and sell the product up there.
Q And that's the DCS product?
A Yes. Specific to the stillage.
Q Do you have any perception on whether it was Sears Petroleum itself or Imus that was selling a product -- the DCS product?

A Imus was selling the DCS product in New York. Sears was selling it in New England.
Q And did you have any perspective on how active Mr. Howard Sears was during that period in that -- in the de-icing business?
A Him personally, or the business --
Q His personally.
A -- the company?
Q His personally.
A Personally, did not see, hear or know of Mr. Sears outside of my one meeting with him. I had a few conversations with Dave Wood, who worked for Mr. Sears. But Mr. Sears himself I did not see as very active at all. And in that time frame, I was at every trade show, traveled the company training and talking about de-icing, and this was an individual that you never saw, nor heard of.
Q And when you said you were giving training and technical information around the, say, 1997, 1998 time period, who were your audiences for that information?
A What would happen is we would -- our distributors would go out to DOTs and counties and cities, and we would put on a conference, where the distributor would rent space in a hotel, they would send invitations out. We would get everywhere from 50 to 300 people that would come in, sit down in the room, and we would give them everything from a four-hour to an all-day presentation on the technology of anti-icing, as it was very new, how to anti-ice, what products were available, what properties there were.
Q If you would turn, sir, to what's been marked by the court reporter as Exhibit 330 in this matter.
MS. JACKSON: John, does that make sense to you, 330?
MR. DELLAPORTAS: Fine by me.
Q (BY MS. JACKSON) Okay. We have a very elaborate document numbering scheme in this case, but I think we're -- I think 330 is a good number.
This is a one-page document Bates labeled SP 00564. It is entitled Memo to Jeff Johnson, Steve Bytnar, dash, Ice Ban, and Greg Baun, B-a-u-n, and Darin, D-a-r-i-n, Crawford of Innovative. Do you recall receiving, around November of 1997, a report done by Mr. Hartley?
A Yes, I do.
Q And you see in the second paragraph, sir, it says, "Mr. Hartley has assembled the data herein from a variety of sources, and we recognize the possibly for error or skewed results based on the bias of the source. For that reason, we are asking each of you to carefully read the attached and contact me as soon as possible." Did you -- do you recall whether you did carefully read the Hartley report that was attached?
A Yes, I did.
Q If you'd turn, sir, to what's been marked Exhibit 331 in this matter. And that's a two-page document Bates labeled SP 00565 and 00566. It's a memo to Jeff Johnson, in typing, and then Dave Wood written in, dated November 25, 1997, from Steve Bytnar. Do you recall this fax transmission by you, sir?
A Yes, I do.
Q Does this relate to the review you did of the 19 -- November 1997 Hartley report?
A Yes, it does.
Q Can you describe your recollection of your reaction to the Hartley report?

A To the best of my knowledge, this report from Mr. Hartley was the first interaction, direct or otherwise, I'd had with Mr. Hartley or his work. As it was explained to me, Mr. Hartley had been commissioned by Sears to prepare an environmental report and his interpretation of de-icing products.

At that time, we were having discussions specifically with the Innovative folks where they wanted us to mix Ice Ban specifically with magnesium chloride. They did not want us to consider mixtures with calcium chloride. They considered that to be egregious, in their mind's eye. I read Mr. Hartley's report, and as I recall, by about the time I hit the second paragraph, I had determined that he -- he either -- he either, one, knew nothing of highway de-icing and de-icing products; or, two, he either knew nothing of the products and was coached to write a report that was very negative towards calcium chloride and very positive towards magnesium chloride. And the further I read, the more that became apparent, as some of what he was writing was just blatantly incorrect. Which is what I believe that I reflected in the memo.

Q Exhibit 331?

A Yes.

Q Did you have concerns after you read the memo done by Mr. Hartley in November 1997 about Mr. Hartley's experience with de-icing products?

A Again, as I stated earlier, it was my belief at that time that the gentleman obviously had no -- had no experience in highway de-icing, and had read a little bit and had made some very misguided assumptions on some of what was in that report.

Q If you look, sir, to Exhibit 332. It's a two-page document Bates labeled SP 554 and 555. A fax message from Mr. Hartley to yourself dated December 22 of 1997. Do you recall this fax message generally, sir?

A Yes.

Q In subparagraph 2, Mr. Hartley states, "Here are some questions and requests for your assistance to enable me to understand the Ice Ban compositions," and then the memo goes on. Do you recall Mr. Hartley making a number of requests of you regarding, again, the composition of the Ice Ban solution and other related scientific issues, as described in this two-page exhibit?

A Both through speaking to him on the phone and through this document labeled 332.

Q And on the phone, to the best you can recall, did he make these same requests for information of you or different ones?

A In much -- in much greater detail.

Q Okay. Do you recall whether you provided information to Mr. Hartley in response to his requests?

A Very much so over the telephone. As I recall, it was a very lengthy phone call, at least one hour in duration. We spoke at length and detail about a number of these things specific to the composition of the Ice Ban, what I thought each individual component of the Ice Ban was responsible for, how I thought it worked, why I thought that it was just as good with calcium as opposed to magnesium, and we spent a great deal of time discussing the data in his report that was either in my opinion or could be proved to be incorrect.

Q And in addition to telling him information on the phone, do you recall, as you sit here, whether you also provided him written information around this time in response

to his requests?

A To the best of my knowledge, I sent him detailed specification sheets. I cannot recall whether I typed a letter or memo to Mr. Wood -- or to Mr. Hartley, excuse me, explaining, in writing, what I spoke to him over the phone, or if he was just taking very good notes as we were speaking.

Q If you look, sir, to Exhibit 333. It's a one-page exhibit Bates labeled SP 687 from Mr. Hartley to you dated January 19, 1998. And it begins, "Dear Steve, David Wood advises me that the material that you had mailed to me had been returned to you," and he goes on to describe that the ice storm probably was the cause for that. Does this refresh your recollection at all that you, in fact, did mail some written material to Mr. Hartley?

A It certainly does, and to the best of my recollection, after it had been returned to me, I did at that point send it FedEx, I believe.

Q And, again, generally, do you have a recollection of what kind of information was contained in that FedEx?

A They were going to be detailed specification sheets, what was contained in the product. I believe -- I believe there was documentation of what my interpretation -- now as I'm trying to recall what was in -- what was in the packet -- of what I believed those products were responsible for, each one of those, you know, what was helping with the eutectic point, what was helping with the corrosion, basically giving him a download of the how and why Ice Ban worked, because at that time, these folks were doing business with us, and we believed it was to our advantage to have them on our side.

Q If you would look, sir, to Exhibit 334. It's a one-page document Bates labeled SP 548, and it's from Mr. Hartley to you dated January 27 of 1998. And you see he's thanking you for the copies of Dale Keep's presentation and a manual of practice related to anti-icing. Does this refresh your recollection, sir, that you also provided these materials to Mr. Hartley?

A Yes, it does.

Q Do you recall the subject matter of Dale Keep's presentation?

A Dale Keep, when I'd mentioned earlier that we traveled the country and did training, it was a two-step process. What would happen first is Mr. Keep was with the -- the Washington State Department of Transportation, and at that time, Mr. Keep was -- was recognized to likely be the foremost authority in the country for the anti-icing technology, how to use liquids.

What we would do is -- is the distributor or Ice Ban would pay for Mr. Keep's time. He was made available through the Federal Highway Research Administration. They would make him available as a trainer. We would pay for his time and his expenses to come out and speak to people about anti-icing. While we had them in the room listening to Mr. Keep, when he finished, then we gave them the sales pitch. So Mr. Keep had a four-hour PowerPoint presentation, of which I forwarded on to Mr. Hartley.

Q Besides the requests for information from Mr. Hartley that we've seen in these documents and you described in the phone conversation, do you recall any other requests for information from Mr. Hartley of you?

A Not formal requests, to the best of my knowledge.

Q You talked of one -- at least one telephone conversation with Mr. Hartley during late 1997. Do you

recall other telephone conversations with him?
A There were at least two, and I believe a third. The first was to discuss my issues with his first report. The second was to go into more depth of -- of what was happening with Ice Ban, how it was happening. The third, as I recall correctly, was specific to proteins. He had a lot of questions about proteins, how they related to corrosion, and if we thought that could be something that was helping with the corrosion inhibition of the Ice Ban.
Q When you stopped working for Ice Ban in around June of 1999, did you then return to spend a hundred percent of your working time for Minnesota Corn Processors?
A That is correct.
Q Okay. And what position did you take at that time?
A They had not changed my title. I held -- I had held a title with Minnesota Corn Processors as, to the best of my knowledge, product development manager. And that took care of my anti-icing obligations to Ice Ban, where I was their vice president of sales and marketing. When the relationship with Ice Ban ended, while I will tell you there was a time that was tenuous, and there was probably an extended period of time where I knew something was going to happen and the relationship was going -- was not going to last, from Ice Ban's point of view, it was rather abrupt.
And right up until I had a fiduciary responsibility to Ice Ban America, so although I knew the relationship was tenuous, a hundred percent of my time and effort was still spent in those efforts. That abrupted -- or that ended, again, abruptly. I was told to take a week off, and when I came back to work, we'd sit down and talk about what I was going to do at MCP, but that I had a job for as long as I wanted to do it. My title there never really changed, because in that week off, that's when I conceived the idea for Caliber, and the week off ended up being two days off, and I went right back to the lab.
Q When you were working as employed by MCP, but working in connection with the Ice Ban products --
A Uh-huh.
Q -- do you recall whether there was any agreement about knowledge that you gained in the course of your experience with de-icing or anti-icing products, who that knowledge would belong to?
MR. DELLAPORTAS: I'm sorry, can you read back that question?
(The last question was read back as follows: "Do you recall whether there was any agreement about knowledge that you gained in the course of your experience with de-icing or anti-icing products, who that knowledge would belong to?")
MR. DELLAPORTAS: I'm going to object unless there's a time period specified.
Q (BY MS. JACKSON) Well, at any time, sir, in your work, when you were employed by MCP, but working in connection with Ice Ban products, do you recall there ever being an agreement as to whether knowledge you gained in working with the de-icing products, which party, if anyone, that knowledge would belong to?
A In the beginning, it was very loose. There was a lot of information changing hands. Again, in my naivete, that's how Ice Ban America ended up with the Steepwater patent. Once the official doc -- once the official, for lack of a better term, partnership agreement between Minnesota Corn Processors and Ice Ban was created, it was, I believe,

stated in the agreement that any advancements in the products belonged to Ice Ban America. Since Minnesota Corn Processors was buying into the company, it was to our benefit as well for them to have that. So at that time, once the official agreement was in place, from that time forward, until it -- the contract was severed, any and all advancements at that time belonged to Ice Ban America.

Q Before June of 1999, did Minnesota Corn Processors sell any de-icing or anti-icy prod -- anti-icing products?

A Only through Ice Ban America. We sold nothing directly into the de-icing market.

Q You -- you mentioned that around June of 1999, when you were taking a break between Ice Ban and going back to MCP, you came up with the idea for the Caliber product?

A Yes.

Q Can you tell me how it was you came up with that idea?

A It's an interesting story, and one I've told a number of times in presentations describing the Caliber product. When you've dedicated about four years of your life to one specific thing, and at that time I was -- I was fairly young and had convinced myself that that was my future, I had -- I had dedicated a hundred percent of my time and effort to this, had developed a reputation for myself as an expert in the industry, was not really prepared to walk away from that.

MCP had informed me that I had a job for as long as I wanted it. Had a lot of a time, a couple of days, just sitting around on the couch, contemplating what I was going to do, what I wanted to do. Came to the conclusion I didn't want to leave the industry. You get a lot of time to look at things in retrospect. Spent a lot of time mulling over things that were said, things that were done, talking about how the products worked, those sorts of things.

And one afternoon, I'm out mowing my lawn, and I remember I used to have these conversations with Mr. Janke, who was a free-spirited entrepreneur who did not know when to stop talking. And I remember having multiple conversations with this gentleman, telling him that he needed to, one, stop making promises that I could not fulfill, because he would make grandiose promises about what the products would do, and immediately following that, I would ask him to quit telling everyone everything about the product, because there are plenty of smart people out there, and one day somebody with half a brain was going to figure out a way to do it better than we were doing.

As I'm sitting there mowing my lawn, somebody -- it was like somebody hit me in the back of the head with a shovel, and I realized that I probably knew more about the chemistry of de-icers than anybody else in the industry, and I believed I had half a brain. And I conceived that I thought I could make a better product. Recalled some of the things on why the product worked. I go back and start -- I start thinking about, okay, these were the components in the Ice Ban, this is how it was working, things that I shared with Mr. Hartley about the phytic acid, about what the proteins did, about what I thought the carbohydrates did, and it hit me, one of the markets that Minnesota Corn Processors always sold corn syrup into it was ice cream.

Most people would believe that you would sell the corn syrup to ice cream manufacturer as a sweetener. That is not the case. It is sold as -- it is sold to provide texture, or mouth feel. If you've ever made ice cream at

home, you notice that the crystals are sometimes rather hard and sharp. By adding of the corn syrup, the crystals are kept from bonding to each other in a certain structure, which makes them softer, and that gave me the idea. Because I was looking for anti-icing, not necessarily specifically to melt ice, but to stop the snow and ice from bonding to the road surface. That was my idea.

The next morning, I was in the laboratory with a rather complicated matrix of tests to begin testing across carbohydrate profiles, and I simply got lucky and hit it on the second day. And hit close enough to the right formulation that I could formulate from there to the finished product that we wanted.

Q And did you, from your work at MCP, know anything about the chemical properties of corn syrup that assisted you making that leap from uses of corn syrup in ice cream to uses of corn syrup in de-icing products?

A Its properties and how it related to ice cream for mouth feel. I knew that being water-soluble, corn syrup would depress the freezing point. I suspected I would get some corrosion protection. The amount of protection we got was a bonus. But I hypothesized that I would get the film-forming techniques that I wanted -- or the film-forming properties that I wanted for anti-icing, and those did, in effect -- in fact, occur when we -- when we put it together. But I knew I want viscosity, I knew I wanted film-forming, I knew I want some eutectic protection, I knew I wanted -- I knew I wanted corrosion protection, but primarily I wanted to be able to stop hard ice from forming.

Q When you say "stop hard ice from forming," is there any sort of scientific word or other characteristic that that can be described as?

A That's what anti-icing is, it stops the bond of ice and snow from the roadway surface. We call it disbonding. Basically -- basically, if you get snow and ice to form on a road and there is no chemical on the road to begin with, it will form a hard bond, and it's there. If you can get the chemical down first, to form a film and prevent what we call the hard bond from forming, even though there's snowpack there, the plows will be able to come along and plow it off. That was the property I was aiming for.

Q So you said you went into the lab the next day and performed tests on a couple products to determine which would give you these properties?

A I performed it on various grades of corn syrup. I mixed grades of corn syrup to alter the vis -- or the -- the carbohydrate profile. I tried straight sucrose, which is sugar. We tried a form of corn syrup called fructose. From those three sugar bases, in varying mixtures thereof, I concluded that carbohydrates from any source could be used to improve the performance of an anti-icing product. And that's listed in my lab notebook. I believe I listed well over a dozen sources of carbohydrates that could be used.

Q Such as? Do you recall?

A Corn, wheat, sorghum, tapioca, sugar beets, sugar cane. Anywhere you could derive a carbohydrate that I could think of at the time.

Q And you have, again, said the word "we". Was anybody else in the lab doing this with you?

A No. Again, that's me. That's -- when I say we, it's -- it was always we as a team at MCP. But it was me. Well, I did have an intern for two months, but cannot even remember his name. And he was not very useful to me.

Q Okay. You said you concluded that carbs from various sources could improve de-icing characteristics, but you said you tested certain, I guess, products, and on the second try came up with one that you believed did work?
A Right. What I did was I tried various mixtures on the first day, was getting differing performance properties, then I contemplated what mixtures of what carbohydrates I want to use, because depending on which carbohydrate you're using, you get different properties based on -- or based on whether it's a -- whether it's a low-end carbohydrate or what we call higher saccharides, saccharides of -- of longer chain length. And I got differing properties, and I wanted a specific viscosity and I wanted a specific eutectic point, and started out to achieve those, and that was what I was able to achieve on the second day. I knew on the first day I was on the right track. By the second day, I got where I wanted to go. Saved myself several months of work.
Q Do you recall what the certain viscosity that you wanted to achieve was?
A It was temperature-dependent. That was one of the things that was key, was viscosity. For the most part, with most products, it was very temperature-dependent. I'm trying to recall off of the top of my head, but I want to say it was three -- again, this is the best of my recollection -- a few hundred centipoise, somewhere above 300 centipoise, somewhere below a thousand centipoise, that would give you enough viscosity that it would still be pumpable, still be usable, still be sprayable, but would provide enough body to stay on the road. Again, those are generalities.
We then took it to the next step of building in enough viscosity to get it to stick in salt piles as well, which is another enhanced property of the product. Another reason that viscosity was important.
Q You said, again, had you a discovery, first while mowing your lawn, and then as you went into the lab the next day --
A Uh-huh.
Q -- which led to the creation of the Caliber product?
A Right.
Q Can you sort of generally describe what that invention that you made around June of 1999 was?
A It was the combination of carbohydrates of a -- of a specific profile type. They don't need to be exact, but to get the type of properties you wanted, you needed to have a profile of specific low-end carbohydrates and a specific volume of the higher-end carbohydrates, 'cause they give you different products. Mixed in varying concentrations with either magnesium chloride or calcium chloride. Did experiment some with sodium chloride, which has turned into another product currently.
And brines, to improve melting capacity, corrosion protection, and -- and anti-icing properties of the chloride brines. It was specific to improve the chloride brines. Then subsequently mixed it with nonchlorides, specifically some acetates, and got some very good results from that as well, of which I listed in my lab work.
Q And what led you to mix the carbohydrate, again, in the specific profiles that is, as you described, with the magnesium chloride?
A Looking at the carbohydrates alone, while a carbohydrate alone will melt snow and ice, and I state in my lab book, and I think it's listed in the -- in the patent

application that you could use a carbohydrate alone as a de-icing product. My goal was to produce the best de-icing and anti-icing product available. I had had experience mixing the products with the current de-icing products such as mag or calcium chloride. It was just the next logical step to do that. Those products were there, they were commercially available, they were inexpensive.

That was the other issue with the corn syrup, is it is substantially more expensive. You could not afford to use it by itself. We needed to improve its performance, at the same time improve the performance of the chlorides, and the two of them together made a product that was affordable.

I approach product development different from most. It's -- it's great to produce a product, it's not so great if somebody can't afford it. So when I work on product development, there is always an eye towards can we even afford to sell it, can we afford to produce it. And that was one of the drivers that also led me to mix it with the chlorides. We had to be able to make it affordable.

Q Again, this is approximately June of 1999?

A Late June of '99. We could find the -- if you wanted to find the exact date, you would need to find the date that Minnesota Corn Processors filed the lawsuit against Ice Ban America. It was that day that was my first day off, and two or three days subsequent to that, I was back in the lab working. And that was late June. We filed the first PCT application towards the end of July, so, you know, I did -- again, was young, not knowing any better, hadn't dated my lab notebook, but in that time, we only lost about 30 days of priority date.

Q What -- you described, again, your idea and then going to the laboratory and working with the various products. What was the next step towards the development of the Caliber product?

A The next step towards the development, I verified and reverified my data, was comfortable that I had reached the properties that I want. That took a few weeks. The corrosion test takes some time to run. Wanted to reverify, talked over my idea with -- I believe I discussed it with Mr. Keep, as he was still at that time recognized as -- as someone fairly important in the industry. Got his input. There wasn't much input there. It was a very brief conversation we had. He thought it was a good idea to be able to have a product that we could control the quality on, which was a key difference between this product and the previous products of the steepwater and the stillage, is our tagline was engineered performance. This was a product that was engineered. This was a product that we could control, without a doubt, every aspect of the quality of the product.

The next logical step was at that time EnviroTech was the biggest distributor for the Ice Ban products. Called up Mr. Noff and said, I've taken this to the next level. If you guys want an option to sell it, we need to find somebody to apply it to the roads. And that's -- they -- they bought some product. We -- and we began running field trials that winter. Very early on, we realized it was going to work, and it was going to work well, and we went from field trials in October to -- to full sales in January.

Q Okay. So you're saying your first -- MCP's first sale of a Caliber product was to EnviroTech, as far as you can recall?

A Yeah. The first -- there was a bulk sale in October of '99. We decided right away we wanted to trademark

it almost immediately. To establish the trademark priority date, we sold a pail of the product in August of '99 from MCP to EnviroTech.

MR. DICKSON: If I could interject at this point. In anticipation that that might be a question that would come out in today's deposition, I'll represent that I didn't personally go down and go through all of the sales receipts with MCP, but I had that done. These are records that have always been kept in the normal course of business. And I have produced copies, today, of the initial sale of product, or the actual purchase on behalf of EnviroTech of the product. And then the subsequent purchase of larger quantities which were used in field trials in the fall of 1999. And I have those available. I made copies for everyone.

MS. JACKSON: You have three copies?

MR. DICKSON: I made three copies.

MS. JACKSON: Okay. Good.

MR. DICKSON: They can certainly be marked. That would be fine.

MS. JACKSON: Let's mark -- let's see. We got 8/27 and 10 -- mark them as two separate exhibits.

(Deposition Exhibits 335 and 336 marked.)

Q (BY MS. JACKSON) Mr. Bytnar, your counsel has provided a document which is -- has the word "Invoice" at the top, and it's dated August 27 of 1999. We have marked it as Exhibit 335 in this deposition. You were at MCP at the time this invoice was generated in August of 1999, right, sir?

A Correct.

Q Do you recognize this Exhibit 335 as an invoice generated by Minnesota Corn Processors to EnviroTech Services in August 27 of 1999?

A Yes. I directed that we -- we ship a 5-gallon pail and invoice them $10 for it. It was done so to establish priority date for the trademark of the Caliber name that we filed for at that time.

Q And are invoices such as this shown in Exhibit 335 created at or about the time of the sale in the ordinary course of business of MCP, in your experience?

A Yes, it -- yes.

Q And in your experience at EnviroTech Services over the past year, do you believe that invoices received by EnviroTech Services are maintained in the ordinary course of EnviroTech's business?

A Yes.

Q Do you recall, sir, whether this invoice and sale from MCP to EnviroTech in August of 1999 was for any particular version of the Caliber product?

A It was for the version that is actually still in use today. We have not varied the original formula from the date of creation.

Q Am I correct that there's at least, though, an M --

MR. PIERING: Sorry.

MS. JACKSON: Just don't get me sick. It's okay.

Q (BY MS. JACKSON) An M1000 and an M2000 Caliber product, at least at this time?

A That is correct. But the -- there is no formula -- formula differentiation in Caliber. The difference between Caliber M1000 and M2000, Caliber M1000 is a blend that is 90 percent magnesium chloride, 10 percent Caliber concentrate. M2000 is 80 percent magnesium, 20 percent Caliber concentrate. The Caliber formulation itself has not changed.

MR. DICKSON: If I could interject. You might want to explain M3000 too.
A M3000. We do have an M3000. It's a specially formulated product with a specific inhibitor that we use to treat -- excuse me, treat one of our granular products called Ice Slicer. We sell and market that in the State of Washington as Ice Slicer Elite. And that is, obviously, following the connotate -- or the denotation, it's 70 percent mag, 30% Caliber concentrate.
Q (BY MS. JACKSON) Okay.
(Discussion off the record between Ms. Jackson and Mr. Piering.)
Q (BY MS. JACKSON) Mr. Bytnar, your counsel has also provided an invoice which is dated 10/20/1999 for a product described as Caliber 5000. In this -- in this instance, the bill is a little bit more than $10, it's a little over $3,000. Do you recall a sale around October of 1999 from MCP to EnviroTech Services?
A Yes. That was the first bulk sale of the Caliber concentrate to EnviroTech for the purpose of conducting field trials.
Q Do you recognize this Exhibit 336 as an invoice created by MCP around the time of the October 20, 1999, sale?
A Yes.
Q And, again, such an invoice is created in the normal course of the business of MCP, right, sir?
A Yes.
Q And, again, in your experience at EnviroTech Services, invoices such as Exhibit 336 are maintained in the business files of EnviroTech Services, Inc., in the ordinary course of business, right, sir?
A Yes.
Q And how do you know that?
A From MCP's side or from the EnviroTech --
Q From the EnviroTech side.
A From the EnviroTech side, I supervise the -- the customer service department, and -- and I understand how -- how the -- how we place the orders, the orders are accepted, how the bills are paid, and then there are plenty of files downstairs containing all the past history of records.
MS. JACKSON: Mr. Dellaportas, based on the testimony that you've heard, do you take any issue -- will you stipulate to the foundation as provided by Mr. Bytnar to the Exhibits 335 and 336 provided today?
MR. DELLAPORTAS: I'm sorry, are you asking me a question?
MS. JACKSON: Yes, sir. Yes, sir. Yes.
MR. DELLAPORTAS: What was the question?
MS. JACKSON: The question is, having heard the foundation provided by Mr. Bytnar, do you accept the foundation for these two exhibits provided today?
MR. DELLAPORTAS: I think that's something that's going to be handled as part of a pretrial order, the document authentication and stipulation. I don't see any need to make any -- state any position as to that right now.
MS. JACKSON: Do you have any specific position or issue with the foundation of these documents as testified to today by Mr. Bytnar?
MR. DELLAPORTAS: Today, no. No, no position. That's something we will take up with the court, along with all the other document issues, at an appropriate time prior to trial. It hasn't been the practice in this case for either side to take any issues as to -- any

document authentification issues in the middle of discovery -- in the middle of discovery or in the middle of depositions, and I see no reason to vary that now, in the final deposition of the fact discovery portion of the case.

MS. JACKSON: Well, again, we -- we -- we proceed in depositions if objections are raised or if they're not, and we have to decide, again, how to -- how to go about the evidence provided in this case based on objections raised. And I've heard no objection to the foundation to these documents raised here today.

MR. DELLAPORTAS: The only thing I'm here today to do is raise objections to any of your questions. We specifically and expressly preserve all objections with respect to foundation or authentification of documents to be made at or prior to trial, certainly not now.

MS. JACKSON: Okay. Well, I disagree. I disagree with that, and I think if you have a specific objection as to foundation at a deposition, you should make it, and with respect to these documents, I would appreciate it if you make it now, so that I might have an opportunity to cure that objection.

MR. DELLAPORTAS: I've stated my position. Well, if at -- if at trial or prior to file, you indicate that you're going to introduce it at trial, we'll take it up at that point.

MS. JACKSON: Well, I'm telling you right now, I have every intention to introduce these two exhibits at trial. So if you have an objection now, I'd appreciate you making it, so we could cure it while the witness is here.

MR. DELLAPORTAS: I'm under no obligation to do that. We'll deal with it at an appropriate time, either pursuant to a pretrial stipulation or pretrial motion practice.

MS. JACKSON: I disagree with your perception of your obligation. But the point is you've made no objection here today.

Q (BY MS. JACKSON) You said, Mr. Bytnar, that you were familiar with an application filed for the Caliber trademark, right, sir?

(Deposition Exhibit 337 marked.)

A Yes.

Q Showing you what's been marked as Exhibit 337 in this matter. And ask if you recognize that exhibit.

A Yes, I do.

Q Take a moment and look it through, please.

(Discussion off the record between Ms. Jackson and Mr. Piering.)

Q (BY MS. JACKSON) Do you recognize this Exhibit 337 as an application filed on behalf of Minnesota Corn Processors for the Caliber trademark?

A Yes.

Q Did you have any role in developing this trademark application?

A Yes, I did.

Q What was that?

A That was to advise counsel as to the name that we had chosen to provide the invoice for the first bill of sale to establish priority date and to provide marketing materials that were also required in the application.

Q And you see, sir, on page Bates labeled C 7346. In the second paragraph. The third sentence states, "The date of first use of the mark anywhere is at least as early as August 27, 1999." Do you see that, sir?

A Yes.
Q And do you agree with that statement?
A Yes.
Q And then the last sentence of that paragraph states, "The mark is used by applying it to product literature and price lists for the goods which are sold as bulk liquid by truck and by rail." Do you see that, sir?
A Yes.
Q Do you agree that was how the mark was used, at least by that date of August 27, 1999?
A Yes.
(Discussion off the record between Ms. Jackson and Mr. Piering.)
Q (BY MS. JACKSON) Does that August 27, 1999, date reflected in this trademark application relate to -- in any way to the Exhibit 335, the invoice dated August 27, 1999?
A It is --
MR. DELLAPORTAS: Object to the form.
Q (BY MS. JACKSON) You can answer, sir.
A It is specific to Exhibit 335.
Q Can you explain what you mean by that?
A Exhibit 335 was created at Minnesota Corn Processors specifically to establish the priority date for the trademark use.
Q You see on pages -- or on page 7353, is that a single-page marketing piece, or does that go with the following pages in any way?
A That is a four-page marketing brochure.
Q Okay. Did you create this four-page marketing brochure which is included in the Exhibit 337?
A I did.
Q And what's the earliest time that you recall this four-page marketing brochure being disseminated by Minnesota Corn Processors? Or used, sir.
A To the best of my knowledge, that would have been sometime in September of '99.
Q And to whom do you believe Minnesota Corn Processors provided this four-page marketing piece around the time of September 1999?
A That would have been provided to EnviroTech Services as a -- as a distributor, as well as to multiple end users through the course of the training seminars that were discussed earlier.
Q Okay. As the year 1999 went on, from September to the end of the year, do you recall providing this marketing piece for the Caliber product reflected in C 7353 through 56 to parties other than EnviroTech?
A Certainly to end-use customers. I do not believe, through the rest of '99, to any other distributors, only to EnviroTech, but there were several hundred that would have been distributed to end-use customers such as state DOTs, municipalities.
Q You said earlier that you -- or MCP sold Caliber to EnviroTech initially for testing. But towards the end of 1999, was the Caliber product also being sold to end users?
A It certainly was.
Q And by whom?
A Through EnviroTech.
Q If you look at page C 7354. Is the anal -- analysis provided there a result of your testing of the Caliber product?
A Yes.
Q And to the best of your knowledge, does that

analysis accurately reflect the components of the Caliber product as of August of 1999?

A As it was then, and as it is today.

Q And the next page, 7355, does that reflect tests that you yourself performed on the Caliber product?

A Yes, ma'am.

Q Also for page 7356, does that chart reflect tests that you performed on the Caliber product?

A Yes.

Q When it says percent DS, what does the DS refer to, sir?

A Dissolved solids.

Q You said that EnviroTech was selling the Caliber product to end users in the end of the year 1999. As best you can recall, what's your understanding of how EnviroTech went about selling the product?

A I would have come out to assist them in sales and marketing efforts, as it was a new product. They would have sold it as they -- as they did their other de-icing products. EnviroTech has a very loyal customer base who understands that the company has the newest and best technologies. They approached agencies that they had good relationships with, explained to them that they had a new product that they wanted tested. They would supply the product. The agency would test it. And on more than one occasion, those agencies would subsequently call to purchase the product based on the performance they -- they witnessed during the field testing.

Q And, again, in the end of the year 1999, is it your understanding that EnviroTech was selling Caliber, in the form of Caliber M1000, as is reflected on page C 7354 and the pages surrounding it?

MR. DELLAPORTAS: Object to the question as leading.

A Yes.

Q (BY MS. JACKSON) And, again, Caliber M1000 is a blend of the Caliber core product with 30 percent mag chloride, right, sir?

MR. DELLAPORTAS: Object.

A That is accurate.

MR. DELLAPORTAS: Objection; leading.

A That is accurate.

MS. JACKSON: I'm, obviously, just summarizing his prior testimony, but if you want to do it from scratch again.

Q (BY MS. JACKSON) Can you explain again what Caliber M1000 is, Mr. Bytnar.

A Caliber M1000 is a blend of the Caliber concentrate mixed with 30 percent magnesium chloride in a ratio of 90 percent by volume magnesium chloride, 10 percent by volume Caliber concentrate.

Q And, again, as best you can recall, what's the components of Caliber concentrate?

A Caliber concentrate -- the components of Caliber concentrate, as it was sold then and is today, is a specific blend of carbohydrates, or a specific carbohydrate profile, based on carbohydrates derived from corn and a very small amount of corrosion inhibitor added, which aids in the assisting of passing very stringent corrosion specifications issued by some agencies. Those variations in the corrosion inhibitor are demonstrated in the page labeled 007357.

Q That being the Shield products?

A The Shield, the Shield AMC and the Steepwater were used as corrosion inhibitors.

Q If you look at page C 7348 and 7349. You see those

pages are signed on behalf of Minnesota Corn Processors by Stanley L. Sitton, S-i-t-t-o-n. Are you familiar with who Mr. Sitton is?
A Yes, I am.
Q How did his position relate to yours as Minnesota Corn Processors?
A Mr. Sitton was my direct supervisor.
MS. JACKSON: Okay. Let's take a break here quick.
THE VIDEOGRAPHER: The time is 3:24. We're going off the record. This is the end of tape one.
(Recess taken from 3:24 p.m. to 3:40 p.m.)
THE VIDEOGRAPHER: The time is 3:40. We're back on the record. This is the beginning of tape two.
Q (BY MS. JACKSON) If you look, sir, to what's been marked Exhibit 338. It's a four-page exhibit with four separate invoices together, the first dated 11/24/1999, the next dated 11/30/1999, the third dated 12/21/1999, and the fourth dated 12/30/1999. These four invoices were produced in this litigation by Minnesota Corn Processors in response to a subpoena to them. Do you recognize the four exhibits in -- the four invoices in Exhibit 338 as invoices generated by MCP at or near the time of sales of the Caliber product to EnviroTech Services?
MR. DELLAPORTAS: Objection; leading.
A Yes, I recognize it.
Q (BY MS. JACKSON) Sir, can you -- do you recognize exhibit -- the invoices which are in Exhibit 338?
A Yes.
Q Can you describe what they are, sir?
A The first three invoices, the one dated 11/24, the second 11/30, and the third dated 12/21, would have been for invoices of truckload quantities, approximately 4800 gallons. The fourth invoice was for a rail car of product that would have been shipped from Marshall to Kersey. That one is dated 12/30 of 1999.
Q And from your experience at Minnesota Corn Processors, were invoices such as those reflected in Exhibit 338 created at or about the time of the sale?
MR. DELLAPORTAS: Objection; lack of foundation.
A Yes.
Q (BY MS. JACKSON) And how do you know that?
A These -- these invoices are generated through our computer system, which is connected to the scales at which the trucks or rail cars are weighed. That is how the exact quantity, to the one hundredth decimal -- or to the one hundredth decimal place, is -- is on the invoice. The order's created, the product is loaded, the -- the weight is entered into the system, and in less than 24 hours, the invoices are generated through the computer system automatically.
Q And that's in the ordinary course of business for Minnesota Corn Processors?
A Yes.
Q And in your experience with Minnesota Corn Processes -- Processors, are invoices such as those reflected in Exhibit 338 maintained in the business records of Minn -- of the company in the course of the ordinary business of the company?
MR. DELLAPORTAS: Objection; lack of foundation.
A Yes, they are. Paper records were held for a certain period of time, and then everything was put on microfilm.
Q (BY MS. JACKSON) And how do you know that?

A Because I had witnessed people putting them on microfilm at various times, and on multiple occasions, for different business purposes, I had to have administrative assistants retrieve invoices and paperwork from the microfilm system.
(Deposition Exhibit 339 marked.)
Q Showing you what's been marked, sir, as Exhibit 339 for this deposition. It's a one, two, three, four-page document. It also was produced to us by Minnesota Corn Processors in response to a subpoena to that company in connection with this lawsuit. Do you recognize Exhibit 339, sir?
A Yes.
Q What is it?
A This is the second phase or the second development of the marketing literature that I created.
Q And as best you can recall, when was this marketing literature reflected in Exhibit 339 used by MCP? Or others.
A Early 2000.
Q And continuing, as best you know, until when, sir?
A Early 2 -- until the form of Glacial Technologies, at which point we revised the literature to reflect the Glacial Technologies name.
(Deposition Exhibit 340 marked.)
Q I didn't know that was going to be your answer, but if you -- can you look at Exhibit 340, sir. It's a multi-page document Bates labeled SP 296 through SP 309. Some of it is not the greatest copy. I apologize.
A It's okay. I can tell you what it says. I wrote it.
Q Okay. What is Exhibit 340, sir?
A Exhibit 340 is the marketing literature and advertising that was developed upon the formation of Glacial Technologies. It is literature that advertises and promotes the Caliber line as well the nonchloride line of de-icers produced by Glacial Technologies.
Q And so the marketing literature reflected in Exhibit 340 would have been used, as best you -- best you recall around what time period, sir?
A The beginning of the formation of Glacial Technologies, which we determined earlier to be --
Q You said mid 2001.
A Yeah. Yes. Middle of -- July-ish of 2001.
(Deposition Exhibit 341 marked.)
Q Showing you, sir, what's been marked Exhibit 341 in this case. It's a multi-page document. It's a patent with the patent number 6,468,442 B2, and it's Bates labeled SP 2790 through SP 2805. Do you recognize Exhibit 341, sir?
A Yes, I do.
Q What is it?
A It is the issued patent based on the work that I had done in the development of the Caliber product.
Q The -- if you see on the first page of this patent, in the abstract, it mentions a sugar-water mixture, and it goes on to mention a particular range of a sugar solid. Do you see that, sir?
A Yes.
Q Can you just generally describe how that description relates to the corn syrup that you were describing using earlier in connection with Caliber?
A That variation in the solids content we used to depict the wide variation in the amount of carbohydrates that you could put into a solution of either water or with another

product, relating specifically to the types of performance you could get based on that wide range in variance. Basically to illustrate that -- that a sugar solution containing as little 15 percent solids or as high as 80 percent solids could be used either alone or with other products to be used as a de-icing product.

Q You see, sir, on the bottom of page SP 2802, the patent is describing, in the description section, one blend of the invention referred to, in quotes, Caliber M1000. Do you see that, sir? At the very, very last line of page SP 2802.

A Yes.

Q And it goes on, on the next page, to describe, again, the formulation of Caliber M1000. Do you see that?

A Yes, I do.

Q And then it goes on to describe the formulation of Caliber M2000, right, sir?

A Yes.

Q And are those formulations the same as that product has been from the mid-1999 period through the present?

A Yes, they are.

Q You described earlier mowing your lawn and having an idea with respect to creation of the Caliber product and then going into the laboratory following that to do some experiments. Were there any resources or pieces of literature or written information that you relied on at all in coming to the discovery you did with respect to the Caliber product?

A As a reference, I went to the Corn Refiners Association. They have several books and manuals of -- of data on corn products and corn syrups. I referenced -- as baseline data for where to start, I referenced what they list as critical data tables, and from those critical data tables, based on specific products of corn syrup, or there are standardized products within the corn syrup line of specific dextrose equivalents that have very specific profiles. Within the critical data tables, I could access viscosity data and -- and freeze point suppression of specific sugars based on concentration. And I used those as a reference. To at least begin to formulate where I wanted to begin.

Q So specifically you recall looking at critical data tables related to viscosity and freeze point depression, sir?

A Yes.

Q Any other properties that come to mind?

A Not that I recall off the top of my head, no.

Q And with respect to the freeze point suppression, do you recall any more specifically what those data tables told you?

A They indicated that the higher the monosaccharide content, the better freeze point suppression you had. Higher saccharides did not give -- give at -- did not perform as well for freeze point suppression, but conversely, when you looked at the viscosity tables, the higher saccharides would provide higher viscosity, the monosaccharides did little to provide additional viscosity. The trick was to get the blend of those for the properties that I wanted.

Q You're speaking in terms of higher saccharides. Does that term relate in any way to the term "DE"?

A Yes. The way that DE is defined, DE is described as dextrose equivalent. And it's not a -- it is a direct correlation of the amount of dextrose within a particular product, but it is not a -- it's not a direct percentage relation. If you have a product that is 36 DE, that does not

mean that it has 30 -- 36 percent dextrose, but it means that that is the dextrose equivalent, and that's an indication of a 36 DE material, that it has little dextrose in it and a high amount, or a larger amount, of higher saccharides. Conversely, if you go to a product such as a 63 or 64 DE product, you have much more dextrose, lower counts of higher saccharides.

Q And do you have an understanding of how DE relates to the molecular weight?

A Yes.

Q What is that?

A The higher -- each individual sugar will have a molecular weight. Dextrose has a molecular weight. Maltose, which is two dextroses together, will have, obviously, twice the molecular weight. Maltotriose has a higher molecular weight, and -- and these chains will run from a single, such as dextrose, up to 10,000 units long, both straight chained and branched. The molecular weight of those sugars are dependent upon how many dextrose molecules are in that chain. The larger the chain, the higher the molecular weight structure.

Q So the higher the DE, the lower the molecular weight?

A Yes.

Q And you said your understanding now. How long have you had that understanding of the relationship between DE and molecular weight?

A As it relates to de-icers, from the time I began formulating this. In general, how long have I had that -- how long have I had that information? Since December of '91, when I began working for Minnesota Corn Processors. It was essential in what we did in the laboratory.

Q Did the critical data tables that you said you looked at with respect to freeze point depression, to your recollection, tell you anything about molecular weight as it relates to freeze point suppression?

A Yes, the lower the molecular weight, the better the freeze point suppression.

Q And that's a publication you said you referred to by the Corn Refiners Association?

A Yes.

Q And you said you looked at critical data tables?

A Yeah. It's -- it's -- basically, that is the name. It's a volume that's listed as critical -- critical data tables, and within that large volume, you will find pretty much any piece of information you want to find in relation to any of the products or coproducts of corn wet milling.

Q Does that -- does the Corn Refiners Association publish such a volume on any regular basis or --

A I'm not sure how often they update it. In the 12 years that I was at Minnesota Corn Processors, I saw at least two different versions. So they do update them. I know they do update them. But essentially, if you are a member of the Corn -- Corn Refiners Association, they -- you get the data. They send you all of their volumes and data. That's part of what you pay for through the association.

Q Okay. We talked about -- we've been talking about a period around, in 1999, and you were working for Minnesota Corn Processors at that time. And then you -- did you ever become employed by an entity other than Minnesota Corn Processors before becoming employed, as you are now, by EnviroTech?

A No.

Q When the Glacial Technologies entity was formed around mid-2001, did you do work in connection with that entity?
A I was the vice president of sales and marketing for that company. But we should be clear that I held title as an officer in that company, my business cards were with that company. I also simultaneously held my position with MCP. I was a contracted employee into Glacial Technologies. Minnesota Corn Processors still paid my salary. My paychecks came on Minnesota Corn Processor checks.
Q And at some point, Archer Daniels Midland purchased Minnesota Corn Processors, right, sir?
A That is correct.
Q Had you already left Minnesota Corn Processors by that point?
A My last day with Minnesota Corn Processors was the first day Archers Daniel Midland owned them.
Q And as best you can recall, what was -- what was that day?
A That was September 5 of 2002, give or take a day or two. I was here the next week.
Q Here at EnviroTech?
A Yes.
Q We looked, sir, at Exhibit 341, a U.S. Patent issued to you -- or in which you were the inventor, ending in the numbers 442. Did you assign the rights to this patent to any entity?
A Minnesota Corn Processors.
Q And as best -- to your information, to your knowledge, does Minnesota Corn Processors still own the rights to the 442 patent?
A Well, I believe ADM does now, as that was one of the assets that they purchased when they purchased Minnesota Corn Processors.
Q And before ADM purchased MCP, to your knowledge, did Minnesota Corn Processors license rights to this 442 patent to anyone?
A Glacial Technologies.
Q Are you aware, sir, of -- since the time that ADM has purchased MCP, who owns license rights to this 442 patent?
MR. DELLAPORTAS: Objection; lack of foundation.
A To my knowledge, Glacial Technologies still owns the license to this -- to the patent.
Q (BY MS. JACKSON) And how do you know that, sir?
A Because we have an exclusive distribution agreement with Glacial Technologies to distribute and sell this product throughout North America, short of the territories we listed earlier.
Q Is it your understanding that others have such sublicenses under the 442 patent from Glacial Technologies at this time?
A One other company.
Q And who was that?
A Syntec Corporation based out of Toledo, Ohio.
Q At some point did you become aware that Sears Petroleum was developing a synthetic de-icing or anti-icing product?
A Sometime around summer of 2000, we began hearing rumors that Sears was producing a product that was -- that could be similar to Caliber. It was always referred to as a synthetic. We could never corroborate it as anything more than a rumor. We could never locate literature. We could

never find anyone that has purchased it. To my knowledge, to this day, I'm not aware that it has ever been sold commercially. We cannot identify or locate anywhere that it's been sold. At the time we could not locate literature. We could not find any information that the product existed other than rumor and speculation from folks in the industry that were generally considered to be unreliable sources of information.

Q If you can recall, when you first heard that Sears was developing the product you just were referring to, do you know whether you heard the word "synthetic" used in connection with that?

A That was the way it was always described, as a synthetic.

Q And when you heard the word "synthetic", did that bring any particular more specific --

MR. DELLAPORTAS: Object to form.

MS. JACKSON: Excuse me.

Q (BY MS. JACKSON) Let me just try it again. When you heard the word "synthetic", did that bring anything more particular to your mind when you heard the word?

MR. DELLAPORTAS: Object to form.

A In my mind, when I heard synthetic, as a -- as a biologist and chemist by education, synthetic to me meant man-made. I envisioned something that was -- was not naturally occurring and had been created by combining elements that were not naturally forming in nature.

Q (BY MS. JACKSON) You said you previously were aware that Sears had purchased the rights to the Toth patent, right, sir?

A (Deponent nodded head up and down.)

Q You have to say yes.

A Yes. Yes.

Q I know the day is getting long. We'll try to move along. At some point did you also come to understand that Sears had a patent related to this synthetic product?

A When we began hearing the rumors, I routinely would check the patent and trademark database, searching under de-icing and Sears. And subsequently, within a month or so after the issuance of the Hartley patent, that was my first confirmed -- what am I looking for -- the first confirmed piece of data that showed me that there was something there more than rumor and speculation. But even witnessing the -- the patent, we still could not locate anything that we would consider as literature or as --

Q Just start back a little bit.

A Even staring at the -- at the patent, once I -- once I located the patent, I scoured and called all of the sources that I had in the industry. Nowhere could we locate any literature, nor could we locate the existence of the sale of the product anywhere within the industry.

Q You said that you were looking on computer for the Hartley patent. Did you ultimately find a copy of the Hartley patent?

A Yes, I did.

Q I'm showing you what's been previously marked in this case as Exhibit 105. It's a multi-page document beginning SP 1179 through SP 1185. Do you recognize that, sir?

A Yes, I do.

Q What is it?

A This is a copy of the patent that was issued to Sears Petroleum with the inventors of Robert Hartley and

David Wood.
Q And when you did locate a copy of this patent, did you review it?
A Yes, I did.
Q Do you recall whether you had any impressions after you reviewed this patent?
MR. DELLAPORTAS: Object to the form.
A After reviewing the patent, I was concerned that it was fairly similar to the -- the Caliber patent. This was subsequently after the formation of Glacial Technologies. Submitted the document to the board of directors of Glacial Technologies, at which time they had it reviewed by patent counsel.
Q (BY MS. JACKSON) Besides your perspective, after reviewing the Hartley patent, that it was similar to your invention, do you recall having any other reactions after reviewing the Hartley patent, sir?
MR. DELLAPORTAS: Object to form.
A When reviewing the Hartley patent, I looked and saw the initial file date of January 5, 2001. Felt that certainly that was after -- after the -- the priority date established with Caliber, and again presented that to the Glacial Technologies board, and -- and suggested that -- that they decide how to deal with it, how they wanted to proceed.
Q (BY MS. JACKSON) Did you have any opinion, Mr. Bytnar, on whether the invention disclosed in the Hartley patent tells one what one needs to know to make a functional de-icing product?
A While it was my opinion that what was contained in this patent would not provide the optimum product, there was probably enough in the patent that someone could figure out how to make a product close to as good as Caliber.
Q Are there any technical issues that come to mind, in looking at Exhibit 105, where you drew the impression that you just described, in terms of not necessarily having optimal information?
MR. DELLAPORTAS: Object to form.
A The one thing that -- that would immediately jump out to me, where they were discussing the molecular weight of the sugars, where -- where I had outlined in -- in the previous patent that I was the inventor of, we outlined what -- what the properties the carbohydrates would give you, what the advantages were. They were specific to molecular weight, listing the -- listing the molecular weight. I spent considerable amount of time dealing with the fructoses and the sucroses and such, knowing that while they were viable, they did not make nearly as good a product as did the specific sugar profile we were using. A lot of -- of what they were doing here was based off of fructose, which indicated to me that while they got close to the right track, it was my opinion that they weren't necessarily running down the right track for what they needed to do.
Q (BY MS. JACKSON) From your experience, do fructose and sucrose and dextrose, for example, work differently as used in de-icers?
A Each of those sugars will all behave much differently.
Q Can you think of examples in terms of the properties or the function that support what you just said?
A For example, when you get the balance of dextrose and higher saccharides correct, as with Caliber, you will get a eutectic or freeze point of 85 degrees below zero Fahrenheit. I could never accomplish anything better than

minus 30 Fahrenheit using fructose. Sucrose was very similar to fructose in the nature that minus -- and I'm trying to recall here, trying to flash back to my lab notebook in my mind -- minus 30 to minus 35. The dextrose -- and -- and it wasn't just the dextrose, it was the dextrose, the maltose, the maltotriose, and the higher saccharides, all three of those had to be combined together to get the right properties.

A lot of what they were doing was focusing on just fructose, just glucose, just maltose. Later on they got into varying some of the DE corn syrups, but even then, I would look at some of their data, and they couldn't accomplish near what we had by getting the balance of the carbohydrates correct. And, again, I apologize. We I say we, we, MCP, me doing the lab testing.

Q If you look, sir, to Exhibit 341. Do you see, on the face of that, which is your patent, the 442 patent, that the -- it lists the primary examiner as Anthony Green. Do you see that, sir?

A Yes.

Q Over the course of your application for this de-icing patent, did you have occasion to speak with Mr. Green?

A Personally, I never did speak with Mr. Green.

Q Including on the telephone, you yourself did not?

A Not to the best of my knowledge. All interaction with the -- that I would have had with Mr. Green was through patent counsel.

(Discussion off the record between Ms. Jackson and Mr. Piering.)

Q (BY MS. JACKSON) Did patent counsel relay to you conversations -- telephone conversations that counsel had with Mr. Green, sir?

MR. DELLAPORTAS: My question is, has there been a waiver of the privilege with MCP? I'm just asking. They're not represented here today, that's why I'm asking.

Q (BY MS. JACKSON) My question is to information that you have only related to what Mr. Green spoke to counsel -- what Mr. Green said, and nothing that counsel other than that told you, sir.

A Okay.

Q And it's a yes-or-no question.

A Yes.

Q Let's start over. Did patent counsel ever tell you anything that Mr. Green said related to the Hartley 793 patent, sir?

A Yeah.

MR. DELLAPORTAS: Object; it's all hearsay.

A Yes.

MR. DELLAPORTAS: And also object that the patent prosecution history is a public document and a matter of record.

Q (BY MS. JACKSON) And what do you recall of what you were told that Mr. Green said with respect to the Hartley 793 patent, sir?

A After I became aware of the -- of the 793 patent, part of -- of what Glacial Technologies decided to do was have -- was have our patent counsel look at it and ascertain their opinion of where we stood with one document in the face of the other.

Q Again -- again, sir, I don't want any information between your attorneys -- you and your attorneys, or your company and your attorneys, other than simply what Mr. Green

said to them.
A Mr. Green, after --
MR. DELLAPORTAS: Same objection. Sorry.
A After our patent attorney contacted Mr. Green, Mr. Green informed him, and patent counsel subsequently informed me, that Glacial Technologies, or at that point the licensed owner of the patent, may want to consider an interference claim against the Hartley patent due solely to priority dates.
Q (BY MS. JACKSON) When you say the owner of the patent, which patent are you referring to, sir?
A The 442 patent.
Q Do you have any more specific recollection at all of what Mr. Green said in that regard to patent counsel?
MR. DELLAPORTAS: Objection. He never spoke with Mr. Green, so he has no recollection of what Mr. Green said. This is all just hearsay.
A What patent counsel advised me was that Mr. Green's advice was is that they investigate an interference claim of the Hartley patent, in looking at the priority dates which have been established and could firmly be proven to backtrack to the earliest priority date.
Q (BY MS. JACKSON) And to your knowledge, sir, was anything done in response to that statement by Mr. Green?
MR. DELLAPORTAS: Object to form.
A At a later date, it -- it had come to my knowledge at a later date, through public documentation, that Glacial Technologies, one or two days prior to my departure, had, in fact, filed that interference claim.
Q (BY MS. JACKSON) But you had no role in filing that interference claim, sir?
A No, I do not. As -- as I have come to understand it, that was the -- the business partners of Glacial Technologies, or Metz, had taken that upon themselves to file that interference claim.
Q You work right now, sir, for EnviroTech Services. Is there any business relationship between EnviroTech Services and the company known as Imus at this time?
A Imus is the U.S. marketing arm for a company called Innovative, which is based in Toronto. It's a Canadian company. EnviroTech Services is 50 percent owner in Innovative.
Q Do you have an understanding of who owns the other 50 percent of Innovative?
A Mr. Greg Baun.
Q You said earlier during this deposition that Imus is currently distributing the Caliber product in the Northeast. Is that right, sir?
A We are -- we are able to assign subdistributors to sell the Caliber product so long as those subdistributors follow and meet the same obligations that we are required to through the distribution agreement, which includes volume projections, not selling competing products, those sorts of things.
Q But the answer to that was Imus is a distributor?
A And Imus has -- yes.
MR. DELLAPORTAS: Objection; leading.
A Yes, we have assigned Imus as a subdistributor for the Caliber products under our exclusive distribution agreement with Glacial Technologies.
Q (BY MS. JACKSON) And, again, earlier in this deposition you said while Imus is currently distributing the Caliber product in the Northeast, they have been not so --

not so successful. Do you remember saying that, sir?
A Yes, I do remember saying that.
MR. DELLAPORTAS: Objection, leading.
Q (BY MS. JACKSON) Do you have any understanding of why Imus has not been so successful in marketing the Caliber product in the Northeast, sir?
A Until recently, it was my opinion, as the marketing director here, that they -- they had not been pushing the product as hard as we had hoped, and we have subsequently, in -- in the past months, been pushing them to promote the Caliber products with a little more vigor than they had been in the past.
Q Since the initial sale of the Caliber products in mid-1999, what products, in your experience, have been the primary competitors?
MR. DELLAPORTAS: Objection; lack of foundation.
A Early on there were no real competitors. There was the Stillage patent, which Sears was selling as Ice B'Gone and Innovative/Imus was selling as Magic, and they were competing head to head with the Ice Ban products. As this product was the next step in the evolution, cleaner, higher performing, more repeatable, we didn't view that we had any direct competition.
Recently, there have been a couple of products, Ice Ban has tried to reformulate with a product that they're claiming is -- is close in performance, and there's rumors of others that are trying to reformulate to match the Caliber product, but we haven't had any significant direct competition for the product.
MR. DICKSON: Let me take a moment.
MS. JACKSON: Sure.
THE VIDEOGRAPHER: The time is -- do you want to go off the record?
MR. DICKSON: You don't need to go off the record. Just turn the mike --
THE VIDEOGRAPHER: Just turn the mike off.
(Discussion off the record between the deponent and Mr. Dickson.)
MR. DICKSON: Thank you.
A One clarification. The answer to the previous question was based specific to liquid anti-icing. We do face one competing product in the market, and that is in the -- in the realm of salt stockpile treatment, which is Clear Lane.
Q (BY MS. JACKSON) How long has Caliber been marketed also as a treated salt product?
A From the same time that it was marketed as an anti-icing agent in mid-1999.
Q And before the inception of the Caliber product, when you were working with the Ice Ban products, were there any significant competitors for the Ice Ban products?
MR. DELLAPORTAS: Object to form.
A There was the stillage product being sold by Sears and Innovative/Imus. There was subsequently, towards the end, a gentleman by the name of Todd Bloomer was using some residue material from the processing of sugar beets. While that product still exists in the market, by my estimation, he has less than 1 percent of the liquid de-icer market in the -- in the country.
Q (BY MS. JACKSON) Have you faced any competition from products from Dow?
A Dow now has a product they call Liquid Dow Armor. It also uses sugar beet residue. Again, we don't consider that a direct competitor, as it's one that -- it falls back

on the old technology. They're -- they're brown, they smell bad, they don't work as good, they have impurities. Again, from the -- from the standpoint of the next evolutionary step in the products, while there are a couple who have tried and some rumors of others that are out there, we haven't seen anybody step in yet and take our market share.
Q When you say market share, what market are you referring to, sir?
A Referred to the -- you could segment the market total de-icers, liquid versus solid. Specifically in the liquid -- in the liquid de-icer, anti-icer there's a segment we identify as the value-added market. There are those customers who will buy commodities, such as pure magnesium chloride or calcium chloride in liquid form. Then there is the value-added market, which are those that contain additives that give higher performance, lower corrosion.
While there are folks out there like Ice Ban and the Magic that uses the distillers that use a piece of that market, we went in and took the majority of their market and have maintained it and gained every year and not faced any subsequent competition from a product that we would consider to be equal.
Q Do you have any understanding -- well, let me just back up. Just to understand your answer, are you saying that the Caliber products fall into that value-added market?
A Correct.
Q Do you have any understanding of, say, for the past year, Caliber's market share in the liquid value-added market?
A We increase every year. Is your question do we have any feel for how much of the value-added market we have?
Q Yeah.
A By our market estimations, probably 75 percent.
Q And what about for the solid value-added market?
A For the stockpile treating? We probably have, specific to Caliber, between 30 and 40 percent of the market.
MS. JACKSON: Why don't we take just five minutes, and I'll see if we I have anything else, and we don't have to take everybody else's time to do it.
THE VIDEOGRAPHER: The time is 4:25. We're going off the record.
(Recess taken from 4:25 p.m. to 4:33 p.m.)
THE VIDEOGRAPHER: The time is 4:33. We're back on the record.
MR. DICKSON: From the standpoint of the answer that Mr. -- the area of inquiry that you just went through with Mr. Bytnar, I would like him to clarify slightly. I don't want to leave an incorrect impression regarding a -- a narrow subject matter of a particular product, which is one of many that this company represents. And if there was in any -- in any way an impression conveyed relative to the totality of the market in the anti-and de-icing arena, I would like Mr. Bytnar to clarify that for the record, so there is no such mis -- misrepresentation.
A Certainly. When we were speaking to market shares and competition and -- and who had what, I was speaking specific to a very narrow segment of the market and related to value-added de-icing and anti-icing chemicals. That is a fraction of the overall de-icing and anti-icing market. White salt last year was something approaching 22 million tons. That is rock salt. Liquid de-icers probably approached somewhere in the neighborhood of 300,000 tons. Of that liquid de-icer 300,000 tons, may be 15 percent of that

is value-added de-icers, which where I spoke that I thought we had the majority of that market share. Very small portion of the overall market, but it's the one that we target.
The second clarifying point I wanted to make was I stated earlier that we are under obligation from Glacial Technologies to meet volume -- to meet certain volume requirements and not to sell competing products. I stated that we had -- that Imus was a subdealer for us, subject and obligated to the same requirements that we were under that contract. We are aware that Imus does sell the Magic product, which is the distillers. We do not, nor does Glacial, consider the distillers product to be a competing product, and for the record, so everyone is clear, no one -- no one within Glacial or EnviroTech considers that to be a breach of the contracts that we have signed, because it is not a competing product in our mind.
MR. DICKSON: And for whatever good that did, I hope that clarifies that issue. I -- I didn't want to leave a misimpression either way. EnviroTech takes an absolutely neutral stance in this lawsuit. We are a competitor to Cargill. We consider them a competitor. And we have, indeed, enjoyed business relationships with your client in the past, so it's not our intention to do anything other than to have Mr. Bytnar respond to your request for a deposition, and as truthfully as possible explain what he knows about that situation. That's what we've endeavored to do today. I didn't want any misconceptions on the record.
Q (BY MS. JACKSON) Okay, sir. I just wanted to follow up on your -- on your clarifications. You were -- you were saying, sir, that the de-icing market generally is broader, much broader, than the value-added market, right, sir?
A Certainly. The value-added market is a fraction of the overall de-icing market in size.
(Deposition Exhibit 342 marked.)
Q Showing you, sir, what's been marked Exhibit 342 in this matter, sir.
MR. DELLAPORTAS: Thanks.
Q (BY MS. JACKSON) This is information which Ice Ban America provided to Cargill in early 1999, sir, which Cargill has produced in this litigation. Before turning to the exhibit, per se, were you -- were you familiar at all, in early 1999, of Ice Ban America's attempts to meet with Cargill?
A I knew that --
MR. DELLAPORTAS: Objection; assumes facts not in evidence.
Q (BY MS. JACKSON) Let me just ask the question again, sir. Were you familiar with any attempts by Ice Ban America to meet with Cargill in early 1999?
A I knew that Mr. Janke was eager to meet with Cargill and was attempting to set up meetings, believing that with the organic additive of Ice Ban America and the -- the vast salt supply of Cargill, that that seemed to be a natural synergy between the two companies. I knew he was actively trying to set up the meeting.
Q Did you have any involvement, sir, in putting together information to provide to Cargill in advance of that attempted meeting?
A I was a large part of most of the information that I see here, listed in the table of contents. I do not recall putting the information together to provide to Cargill. That does not mean that I didn't have part in it. It was, at the

time I was doing it, not necessarily my direct knowledge it would be presented to Cargill.

Q Okay. If we could just go through this exhibit 342, sir, and -- and there's various portions. But if you could just let me know what documents within 342 you did have a part in creating.

A Article 1, the HITEC evaluation, that was an evaluation through Civil Engineers Research Foundation, for which I sat on the board as the technical advisor to the study. Took almost two years to complete, 12 months longer than it was supposed to have. The same of the EVTEC; very similar, done through the same organization. As opposed to a performance evaluation, this was an environmental evaluation. Was part of the creation of those documents. Testing with SMI, those were samples sent -- I had sent the samples off, compiled the data, and reviewed the data as it came back. So I was a part of -- of those documents as well.

Toxikon, that environmental report that they issued, just as with the others, I was providing the samples, reviewing the data, corresponding with -- with Toxikon. Envirodyne is a company that I am not familiar with, but as appears here, that was used for the Tembind products, which was a division that I only had cursory involvement in. The New York State Department of Environmental Resources, that was something Mr. Johnson had put together. I was aware of it. Had no part in it.

The Washington State DOT and Northwestern Consortium of States Product Specifications for Bidding, those all would have been things that I would have collected and organized. In saying this with as much modesty as possible, at that time, there was no one at Ice Ban America who would have had the ability to understand or correlate what they were putting together there. Anything from the Lignin Institute, that was through the Tembind division, which I had little to no involvement in.

Q Turning to the next page, C 625, and continuing to 262, a summary of testing and developments. Are you familiar at all with the compilation of this testing and the developments such as shown here on 65 and 66?

A Yes, all of this -- again, anything that had to do with -- with any of the de-icing would have most likely been through me.

Q Turning, sir, to page C 657, continuing through 671. It's entitled a Comparison of De-Icing Compounds. Do you recognize this document at all, sir?

A This appears to be the document that Mr. Hartley created that was the subject of discussion earlier in the deposition. That would be the one that I had taken exception to in regards to some of what he had stated in regard to the performance of the products, both from melting capacity as well as corrosion.

Q Actually, sir, if you look back to Exhibit 330. That was a November of 1997 report.

A This was a -- this was a subsequent report where he was still trying to describe, in more detail than necessary, as I told him on multiple occasions, how corrosion took place, and he was still, as it -- as I'm recalling from this report, trying to indicate that magnesium chloride was the only choice for Ice Ban and that calcium chloride should have no part in -- in any of the solutions with Ice Ban. Again, this was a time when -- when Sears and Imus were trying to convince us that this should only be cal -- or magnesium. They didn't want to us form any alliances or partnerships

with companies who supplied calcium chloride.
Q And if you'd turn, sir, to C 673 through 696. It's a technical evaluation report dated April of 1998. Are you familiar with that document, sir?
A Yes. That is the HITEC report that I referenced earlier as item No. 1 in the table of contents of this exhibit.
Q Do you have a general understanding of where this -- the Highway Innovative Technical Evaluation Center obtained information that is reported in this report?
A They either obtained the information directly from me or from highway agencies testing the product or from third-party laboratories that Ice Ban America funded to have the testing done through this HITEC evaluation.
Q Turning now, sir, to pages C 698 through C 701. Do you recognize those pages, sir?
A Yes. This is a document I created. We discussed earlier in the deposition what work I had done to improve the product. I had come back and said that in -- in the ear -- early on they wanted to sell it only in a 50/50 blend. I had argued that was not the best product for certain applications and argued vehemently that we be able to alter the formulation. It took me some time for that be able to come to fruition, but eventually they did accept it, and we began calling it the Ice Ban M80 Blend.
MS. JACKSON: Mark this please, and this. John, I don't have copies for either of us. I only want to establish --
(Deposition Exhibits 343 and 344 were marked.)
MR. DELLAPORTAS: Really. Are we off the record?
MS. JACKSON: No, we're on the record.
MR. DELLAPORTAS: Okay.
MS. JACKSON: I don't have copies for either of us of these. I just have basically one question.
MR. DELLAPORTAS: What are they, can you just --
MS. JACKSON: Sure. Just following on from the portion that we just spoke about within 342.
MR. DELLAPORTAS: Let me -- let me just write down what these are so you can have them.
MS. JACKSON: Sure.
MR. DELLAPORTAS: Off the record, what's the Bates number --
THE VIDEOGRAPHER: Wait a minute. Time is 4:47. We're going off the record.
(Discussion off the record.)
THE VIDEOGRAPHER: The time is 4:48. We're back on the record.
Q (BY MS. JACKSON) I'm showing you, sir, what's been marked Exhibit 343 in this deposition, and it's Bates labeled C 594 through C 609. And I ask you, sir, if you recognize that exhibit.
A Yes, I do.
Q Can you tell me what it is, sir?
A This is a progress report on the HITEC evaluation that was taking place of the Ice Ban products. When we began the HITEC evaluation, it's a rather expensive process whereby, basically, you're getting a government agency to evaluate your product and report on it. This process was supposed to take nine to 12 months. At about the 14th month -- 14-month mark, from a marketing standpoint, I became very impatient. We had been promising potential customers such a report, had not issued yet. We pressured the Civil Engineer Research Foundation, through HITEC, to issue an

interim report to let people know that they were, in fact, working on it, this was something that was real, and the preliminary results were fairly positive.
Q Showing you, sir, what's been marked Exhibit 344 in this matter, and it's Bates labeled C 361 through C 470. And I ask you, sir, if you recognize that document?
A Yes, I do.
Q What is it, sir?
A That is the final evaluation of the HITEC report.
Q And, again, sir, in your understanding, from working with that group in connection with that report, where did the HITEC center obtain the information that's contained in that report?
A All of the data contained in this report would have been obtained from myself, through testing that we had done prior to the HITEC evaluation and from highway agencies who were testing it, as well as from third-party laboratories who had done testing on our behalf at Ice Ban America.
Q At some point, Mr. Bytnar, after the issuance of the Hartley patent, did you become aware that counsel on behalf of Sears Petroleum had written a letter to Minnesota Corn Processors regarding whether one of Minnesota Corn Processors' products may be covered by the Hartley patent?
MR. DELLAPORTAS: Objection; leading, states facts not in evidence.
Q (BY MS. JACKSON) I'm simply asking, sir, if you're aware of that occurring or not.
A Yes, I was aware.
Q Do you have any recollection, as you sit here today, of who responded to counsel for Sears on behalf of Minnesota Corn Processors?
A Mr. Joe Bennett.
(Deposition Exhibit 345 marked.)
Q Showing you, sir, what's been marked Exhibit 345 in this matter, a three-page document Bates labeled SP 1644 through 1646.
THE VIDEOGRAPHER: Please be careful of your mike. You're covering your mike with the paper.
Q (BY MS. JACKSON) Take a second to look at it, sir, and let know if you've ever seen this letter before.
MR. DELLAPORTAS: I'm sorry, what number is this?
MS. JACKSON: 343, I believe.
THE DEPONENT: 45.
THE REPORTER: 45.
MS. JACKSON: 45. Right.
Q (BY MS. JACKSON) My question, sir, is if you recall seeing this letter before.
A Yes, I do.
Q Do you see in the second sentence it says -- or Mr. Clement, who writes this letter, says, "I am intellectual property counsel for Glacial Technologies, Inc., which is a joint venture between Minnesota Corn Processors and MOI Associates." Do you see that, sir?
A Yes.
Q Do you have any understanding of whether Mr. Clement was responding on behalf of Glacial Technologies to Sears' correspondence with MCP about the Hartley patent?
MR. DELLAPORTAS: Objection; leading.
A Yes, he was responding to the letter sent to Mr. Bennett.
Q (BY MS. JACKSON) Subsequent to this correspondence between counsel related to Minnesota Corn Processors' product on the one hand and the Hartley patent on the other hand, did

any meeting occur between the parties related to that issue?
A Yes. There -- you mean between Glacial Technologies and Sears?
Q Yes, sir.
A Yes, there was a meeting that took place.
Q Showing you what's been marked Exhibit 11 previously in this case. It's a two-page document, SP 0349 and SP 3050. While it is marked attorney's eyes only by Sears Petroleum, the protective order in this case allows someone shown as the -- on the face of the document as having sent or received it to be able to see such documents. Is this a letter sent by you, sir?
A Yes, it is.
Q Was this a letter sent by you in advance of the meeting between the parties that you just described?
A Yes, it is.
Q Can you explain the purpose of this letter, sir?
A The purpose of this letter was to establish a foundation by which Glacial Technologies and Sears could sit down and discuss a business as opposed to legal resolution to the conflict or perceived conflict of the two patents.
Q And in the bullet points on the first page, you outline thoughts regarding a basis for an agreement, right, sir?
A That is correct.
Q Do you know where those ideas came from?
A Those ideas were from within our group at Glacial Technologies.
(Discussion off the record between Ms. Jackson and Mr. Piering.)
Q (BY MS. JACKSON) How many meetings occurred between Glacial Technologies on the one side and representatives of Sears Petroleum on the other related to the Hartley patent, sir?
MR. DELLAPORTAS: Objection; lack of foundation.
Q (BY MS. JACKSON) To your knowledge.
A Face-to-face meetings during my tenure with Glacial Technologies, two.
Q Were you present in both of those?
A Yes, I was.
Q And who was present also with you on the Glacial Technologies side of things?
A In the first meeting, we met in Chicago. From the Glacial Technologies side it was myself, Richard Schoenfeld and Axel Johnson.
Q And on the Sears side who attended that first meeting?
A Ron Francis, David Wood, and Howard Sears.
Q And then who was present at the second meeting with both parties?
A Richard Schoenfeld and myself from Glacial Tech, and from Sears, David Wood and Howard Sears.
Q Did the parties in those meetings discuss the ideas that you've proposed in this Exhibit 11, sir?
A Those ideas and variations of.
Q To your knowledge, sir, did the parties ever come to a final agreement with regard to the Hartley patent, sir?
A There were multiple heads of agreements drawn up where we had the basic outline, but there was never a formal resolution or document signed.
Q Did anyone from Sears Petroleum ever tell you that it had concerns that Cargill was infringing the Hartley patent?

A Yes.
Q When's the first time you recall someone telling you that?
A In the first meeting in Chicago, which was in the February/March time frame, right after this letter. That would have been February, March of 2002. At the meeting in Chicago.
MS. JACKSON: I have no further questions of you, sir. Thank you for your attention.
MR. DELLAPORTAS: You need a break, or can we start?
THE DEPONENT: We can start.
MR. DICKSON: He needs to start. I've got five minutes to get to -- no, I'm just kidding.
MR. DELLAPORTAS: I should have -- I should have less --
MR. DICKSON: I just made arrangements for somebody else to unlock the door.
MR. DELLAPORTAS: Okay. Good. I should have less than an hour.
MR. DICKSON: Let's hope so.
EXAMINATION
BY MR. DELLAPORTAS:
Q Good afternoon, Mr. Bytnar. My name is John Dellaportas. I'm counsel for Sears Petroleum and Seaco, the new Seaco in this litigation. Just a few clarifications on some of your earlier testimony. At one point you had expressed the belief that Sears and Imus was opposed to the notion of either MCP or EnviroTech partnering up with a calcium chloride manufacturer; is that correct?
A That was my belief, yes.
Q Okay. Best of your knowledge, has Sears ever sold magnesium chloride?
A I believe they have.
Q Have. Okay. You testified earlier about an interference application filed against the 793 patent. Do you know what the 793 patent is?
A The 793 patent is --
Q Let me -- if I could direct you to 105. Would it be easier if I referred to it as the Hartley patent?
A Yes, it would.
Q Okay. And what about your patent? Would that be easier if I referred to it as the Bytnar patent or the 442 patent --
A The Bytnar patent. I've never memorized the numbers.
Q Okay. So let me withdraw that prior question. You testified earlier about an interference application filed against the Hartley patent?
A Yes.
Q To the best of your knowledge, who filed that application?
A To the best of my knowledge, that was done by two members of the Glacial Tech board that were in place through Metz. Specifically, that would be Axel Johnson and Rich Sapienza.
Q Okay. Do you know when they filed that application?
A I believe, to the best of my knowledge, it was filed just before the purchase of MCP by ADM.
Q Do you know if that was an independent decision on their part or if it was under the direction of some other party?

MS. JACKSON: Objection, vague.

A While still employed there, I had given 30 days' notice. While I felt that I was still in the loop on most issues, this was one that I was certainly unaware of and subsequently did not become aware of until several months later.

Q (BY MR. DELLAPORTAS) How did you become aware of it?

A I became aware of it when -- through discussions with Rob Green of Glacial Tech. He indicated to me that he was unaware, but had become aware as well.

Q Okay. To the best of your knowledge, has the U.S. Patent Office declared an interference with respect to the Hartley patent?

MS. JACKSON: Objection; lack of foundation.

A I have no knowledge beyond the fact that it was filed.

Q (BY MR. DELLAPORTAS) Okay. You don't know what became of that?

A I have -- no.

Q Okay. If I could direct your attention to 336, 335 and 338. Those are all the invoices.

A Bottom of the pile here.

Q Let's start -- let's just go in order. Start with 335.

A Okay.

Q The 5 gallons of Caliber, is that -- was that the concentrate, or is that a mixture with some chloride salt?

A That is the concentrate. All invoices will be for the concentrate. Minnesota Corn Processors did not have, nor ever did they have, magnesium chloride.

Q So -- so MCP has never sold a chloride mixture?

A Not to the best of my knowledge.

Q Okay. What about EnviroTech? Do they sell a chloride mixture with the Caliber concentrate?

A That is -- in regard to the Caliber products, that is the primary product that we sell.

Q Okay.

A Is the mixtures.

Q Do you have any knowledge as to when EnviroTech first began selling the Caliber mixture to third parties?

A That would have been in October of '99, while they were field trials. Matt Duran, who is the vice president of sales and marketing here, is in the habit of giving nothing away. Even while it was in test, in my mind, I'm fairly confident that he would have charged them for it. If not in that event, certainly in November, when we began shipping large quantities, that was for sale at resale and not for field test.

Q Okay. The information exchanged between you and Mr. Hartley that you testified to earlier today, did that take place during the period when MCP and Sears -- strike that -- when Ice Ban and Sears were in some sort of business relationship?

MS. JACKSON: Objection; vague.

A Yes, it was a -- there was a business relationship. Whether it was formalized or not, I am unaware. But at that time, I was advised by Ice Ban America that I should cooperate with Mr. Hartley, and if I could advise him in ways that would help him to help Sears, that I should do so.

Q (BY MR. DELLAPORTAS) Okay. And when did that business relationship terminate?

MS. JACKSON: Objection; vague.

A The exact date I am unaware. It was going to be very soon after Mr. Sears returned from his vacation in Hungary.
Q (BY MR. DELLAPORTAS) Okay. And then it was subsequent to that that you had what you described as your light bulb moment in June of '99?
A Yes, it was after that.
Q Okay. Subsequent to what you described as the light bulb moment, did you have any similar information exchanges with Mr. Hartley?
MS. JACKSON: Objection; vague.
A On multiple -- on -- on at least three occasions via phone we discussed the components of the product and what my opinion was that each of those components did.
Q (BY MR. DELLAPORTAS) What time period was that?
MS. JACKSON: Same objection, as that's a predicate to the prior question. You can answer if you understand.
A Again, earlier in my testimony I indicated that the exact dates for me are somewhat vague, but they're going to be in and about the time that we were discussing and Mr. Hartley and I were exchanging these memos, so that would have been late '97 to early '99 -- or '98.
Q Okay.
MR. DICKSON: Can you have him clarify what product we're speaking of? We've had a number of products --
Q (BY MR. DELLAPORTAS) You're talking about the Ice Ban product?
MR. DICKSON: Thank you.
A Yes, the Ice Ban product.
Q (BY MR. DELLAPORTAS) So going back to your -- what you call your light bulb moment in June of '99. Subsequent to that, after that, did you have any discussions with Mr. Hartley?
A After that, no. My last discussion with Mr. Hartley would have been mid-'98. Once the -- once the relationship between Ice Ban America and Sears becomes strained, I had no contact with Mr. Hartley.
Q Okay. And at a certain point after that, Sears and Ice -- Ice Ban became competitors, correct?
A Yes.
Q And Sears and MCP, do you view those as competitors?
MS. JACKSON: Objection; vague.
A Sears -- currently, do I consider them competitors at that time?
Q (BY MR. DELLAPORTAS) Let me withdraw it and ask something else. If we could refer now to the -- the Bytnar patent, Exhibit 341. I believe earlier you testified that the invention embodied in here was -- was very similar to the invention embodied in the Hartley patent; is that correct?
MS. JACKSON: Objection; mischaracterizes the testimony -- or attempts to summarize -- overly summarize his testimony.
A I had concerns that they could be fairly similar.
Q (BY MR. DELLAPORTAS) Okay. How would you describe the invention embodied in the Bytnar patent?
A I describe it as a specific mixture of particular carbohydrates to improve the performance of -- of liquid -- of liquid de-icers, both of the chloride and nonchloride variety.
Q And this is your invention, correct?
MS. JACKSON: Objection; vague.
A Yes.

Q (BY MR. DELLAPORTAS) At the time you came upon this invention in, I think you said June of '99, did you consider your invention to be obvious to a person of ordinary skill in the art?
MS. JACKSON: Objection; vague.
A No.
Q (BY MR. DELLAPORTAS) Why not?
A Because it hadn't been done before. It couldn't have been that obvious.
Q Okay. And when you say it hadn't been done before, what do you mean by that?
MS. JACKSON: Objection; vague.
A No one had -- while the use of some of these organics were being done through the Magic and the Ice Ban, there was not a product out there that competed with the product such as this on a level of purity, on a level of performance. While these products, Ice Ban and Magic, were available, countless customers were begging for something better because of lack of quality control, odor, smell, impurities, those sorts of things.
Q (BY MR. DELLAPORTAS) Would a person who had looked at the -- say the Toth patent, would he have been able to reasonably anticipate the results that you document in your patent?
MS. JACKSON: Objection; vague, improper hypothetical.
A I don't believe so.
Q (BY MR. DELLAPORTAS) Why not?
MS. JACKSON: Same objection.
A Because the Toth patent was only specific to the distillers, and in my opinion, there was not sufficient breakdown and explanation in the Toth patent to explain exactly what it was that they thought was doing the performance enhancing.
Q (BY MR. DELLAPORTAS) Have you ever had occasion to review a patent by an inventor called Peel for a de-icing product? P-e-e-l.
A No.
Q What about an inventor called Johnson for a de-icing patent?
MS. JACKSON: Objection; vague.
A I know Mr. Johnson applied, I believe, for the brewer's condensed solubles, but I've never reviewed his patent.
Q (BY MR. DELLAPORTAS) Okay. What about the Janke patent? I believe you testified to a Janke patent earlier for either corn stillage or corn -- what was the other one -- steepwater?
A Steepwater. It would be my testimony that the Steepwater patent should have my name on it and not Mr. Janke's.
Q Have you --
MR. DICKSON: Make that real clear.
Q (BY MR. DELLAPORTAS) Have you had occasion to review that patent?
MS. JACKSON: Objection; vague.
A Most of that patent is -- is my work, so yes, I have reviewed it. But there was no need. Most of it's mine.
Q (BY MR. DELLAPORTAS) Okay. Do you believe that someone reasonably skilled in the art and reviewing the, quote, Janke patent would be -- would be able to anticipate the inventions documented in your patent?
MS. JACKSON: Objection; vague.

A Again, no.
MS. JACKSON: Objection; vague and improper hypothetical.
A Again, no. It is my opinion that even in those patents, at that point we were not being specific carbohydrates, we were talking about the use of steepwater as steepwater existed. We did not break down in the patent what each composition was, what we thought it did, why it did it. It was -- it was what it was, and that's what we used it for. It was more of an application type of patent than it was a -- a patent outlining the chemical composition.
Q (BY MR. DELLAPORTAS) Okay. What about in the overall scientific community? To the extent you've researched de-icing issues, were you aware of any published research which embodied or stated or disclosed the invention stated in your patent?
MS. JACKSON: Objection; vague, compound.
A Obviously not. If I had, we would have listed it in the references of the patent.
Q (BY MR. DELLAPORTAS) What about the HITEC report? Does the HITEC report disclose the invention embodied in your patent?
MS. JACKSON: Objection; vague.
A Not in my opinion.
Q (BY MR. DELLAPORTAS) Okay. What about that corn processors manual you described?
A The Corn Refiners --
MS. JACKSON: Same objection to the question. Objection; vague.
A The critical data tables of the Corn Refiners Association, is that what you're referring?
Q (BY MR. DELLAPORTAS) Yes, sir.
A No, it is not my opinion, because those were specific to food-grade ingredients and how they react in food.
Q Okay. You testified earlier that it was known in the scientific community that you could put corn syrup in ice cream and it would help crystallization. How come that doesn't make your patent invention obvious?
MR. DICKSON: For the record, that's a misstatement of the characterization of the testimony.
MS. JACKSON: Yeah --
MR. DICKSON: Straight up.
Q (BY MR. DELLAPORTAS) Let me withdraw that question. The use of corn syrup in ice cream to prevent crystallization, does that make your -- the invention embodied in your patent obvious?
MS. JACKSON: Objection; vague, calls for a legal conclusion.
A In my opinion, no.
Q (BY MR. DELLAPORTAS) Why not?
MS. JACKSON: Same objection.
A Because for the use in ice cream, it's for texture and mouth feel, and we are specific to melting snow and ice on a highway and preventing a bond from forming on the road surface. It has nothing to do with a food ingredient.
Q (BY MR. DELLAPORTAS) Any why are those so different?
MS. JACKSON: Objection; vague, and mischaracterizes testimony.
A Because you're using just the carbohydrates in the ice cream, and it's used for a different function. We're using variations of and very specific carbohydrate profiles

mixed with other ingredients in using it to make highways safer, not make ice cream better to eat.
Q (BY MR. DELLAPORTAS) Could someone who had knowledge of the use of corn syrup and ice cream have reasonably anticipated the invention embodied in your patent?
MS. JACKSON: Objection; vague, improper hypothetical, uses legal terms, and call for a legal conclusion to the extent it does.
A In my opinion, no. No one, despite the fact that the industry was screaming for better products, nobody had done it before. In my mind, that doesn't make it obvious.
Q (BY MR. DELLAPORTAS) Have you ever read an article by an individual called Sebree entitled Brewer's Condensed Solubles, Composition and Physical Properties?
A No.
Q Okay. Are you familiar with a patent by an inventor called Kursk, K-u-r-s-k?
A No.
Q What about by an inventor called Kuhajek, K-u-h-a-j-e-k?
A Not that I've reviewed.
Q Do you believe the Ice Ban product made the invention embodied in your patent obvious?
MS. JACKSON: Objection; vague, calls for a legal conclusion.
MR. DELLAPORTAS: I'm sorry, let me strike that question.
Q (BY MR. DELLAPORTAS) Do you believe the Ice Ban product made the invention described in your patent obvious?
MS. JACKSON: Objection; vague, calls for a legal conclusion.
A I believe I answered a very similar question to that earlier, and, again, my response is no.
Q (BY MR. DELLAPORTAS) Okay. And why is -- why is that?
MS. JACKSON: Same objection.
A For the same reasons as stated previous. Within those products and within those patents, outside of -- of my personal belief and knowledge of what I thought what was happening within those products, those products were used for what they were, not for what they contained. You had no control over what was contained within them. They were what they were.
Q (BY MR. DELLAPORTAS) Okay. Does the calib -- strike that. Does your patent -- strike that. I'm sorry. Does the invention described in your patent merely describe a purified version of what was described in the Ice Ban product, or is it something more?
MS. JACKSON: Objection; vague, compound.
A It is something more.
Q (BY MR. DELLAPORTAS) Why is that?
MS. JACKSON: Same objections.
A Because it is not just a purified version, it is a specific -- it is specific to how it is used, the carbohydrate profiles that are required. It's -- it's specific to an embodiment of an improvement of anything that had been done before, so in my mind, no, it's -- it's not the same. It's not an improvement of what was before, it's something different used in different ways.
Q (BY MR. DELLAPORTAS) Were you able to come to your invention by simply routine investigation, or did it require something more?
MS. JACKSON: Objection; vague.

A It depends on what you refer to as routine.
Q (BY MR. DELLAPORTAS) Just how -- answer it in your common understanding of the word "routine".
MS. JACKSON: Objection; vague.
Q (BY MR. DELLAPORTAS) Did you consider your research, in coming up with this invention routine, or did you consider it something beyond routine?
MR. DICKSON: Well, without a definition, I'm going to instruct him not to answer the question, because it places on him to understand what you mean by your term. If you want to define your term, I'll have him answer it.
MR. DELLAPORTAS: Fair enough.
MR. DICKSON: I did practice trial law for 32 years. I have been restraining myself all day here.
MR. DELLAPORTAS: It was a wonderful objection. I -- I withdraw the question.
Q (BY MR. DELLAPORTAS) You testified earlier that the -- what you called the value-added de-icing market was only a very narrow portion of the total de-icing and anti-icing market; is that correct?
A That is correct.
Q Do you have any belief, in your role as a marketing product director, as to the direction the value-added market is going?
MS. JACKSON: Objection; vague.
A Certainly recent years have indicated that that market segment is growing. But so are all others.
Q (BY MR. DELLAPORTAS) Okay. How has the market for -- the value-added submarket, let's call it. How has that market performed in, say, the past three years?
MS. JACKSON: Objection; vague.
A It's -- it's growing.
Q (BY MR. DELLAPORTAS) Okay. Can you describe how rapidly?
MS. JACKSON: Same objection.
A It's -- it's tough to put your hands around that, because it's dependent upon the winter season. If you had the same exact amount of snow every year, it would be easier to get your hands around it. It is -- it is my belief that that segment is growing at a -- at a rate that is likely higher than some of the other market segments.
Q (BY MR. DELLAPORTAS) Okay. Is -- is the value-added market growing as a percentage of the total anti-icing and de-icing market?
A That -- that calls for an awful lot of speculation.
MS. JACKSON: Let me just object before you answer as calling -- lack of foundation.
A I would state that that calls for a lot of speculation, and in the large picture, no. Because as I told you, I think it's growing at maybe a faster rate. As a fraction of the overall market, small amounts of growth in the overall market will overcome the amount of growth in that market.
Q (BY MR. DELLAPORTAS) Okay. I understand that. That's as a simple arithmetic?
A Uh-huh.
Q Do you have any belief as to the direction the value-added market will take over the coming years?
A Mark --
MS. JACKSON: Objection; vague.
A Market indicators currently would tell us that that market is going to continue to grow as the industry continues to want better products.

Q (BY MR. DELLAPORTAS) Okay. You testified earlier that there were 22 million tons of rock salt sold last year, correct?
A Correct.
Q Do you have an understanding or estimate as to what portion of that rock salt is treated rock salt? Either sold treated directly or treated by the end user.
A There's --
MS. JACKSON: Objection; lack of foundation.
A There's a great deal of speculation there. There are people out there that are doing that outside of -- of the EnviroTech group, and we -- it's too hard for us to speculate as to how many gallons they have treated or how many tons they have treated.
Q (BY MR. DELLAPORTAS) Okay. Do you have a belief as to whether the percentage of rock salt treated with these liquid de-icers will grow or shrink in the coming years?
MS. JACKSON: Objection; vague, lack of foundation.
A My personal belief is is that market will continue to grow.
Q (BY MR. DELLAPORTAS) Why do you believe that?
A Again, for the same reason, the value-added liquid market will grow. The customers want better products.
Q Okay. And why are those products better?
A They perform better, they provide lower corrosion. Performing better means use of less salt, which is -- which is environmentally sound.
Q Okay.
MR. DELLAPORTAS: If we could just take a break, I might be done.
THE VIDEOGRAPHER: The time is 5:22. We're going off the record.
(Recess taken from 5:22 p.m. to 5:26 p.m.)
THE VIDEOGRAPHER: Time is 5:27. We're back on the record.
Q (BY MR. DELLAPORTAS) Are you familiar with a de-icing patent by an inventor called Richard Sapienza?
MS. JACKSON: Objection; vague.
A I believe Mr. Sapienza has more than one patent.
Q (BY MR. DELLAPORTAS) Have you had occasion to review one or more of those patents?
MS. JACKSON: Objection; vague and compound.
A Yes, I have.
Q (BY MR. DELLAPORTAS) How many of those have you reviewed?
A Two, maybe three.
Q What are those patents for?
MS. JACKSON: Objection; vague, compound, lack of foundation.
A Those patents are for varying formulations of de-icers based on multiple formulations.
Q (BY MR. DELLAPORTAS) Would a person skilled in the art reading any of the Sapienza patents, or all of the Sapienza patents together, be able to reasonably anticipate the invention described in your patent?
MS. JACKSON: Objection; vague, compound, lack of foundation, calls for a legal conclusion, lack -- and improper hypothetical.
A Not sure I'm qualified to answer that.
Q (BY MR. DELLAPORTAS) Okay. Would some -- would your invention have been obvious to someone reading the Sapienza patent?
MS. JACKSON: Same five objections.

A Depending upon which Sapienza patent you read, I -- without violating any release that may or may not have been signed, there were previous issues due to previous negotiations between MCP and Metz before the form -- before the formation of Glacial Technologies, at which point certain information was shared with Mr. Sapienza, at which point the direction of his intellectual property changed.

MR. DICKSON: And it's really subject to a confidentiality agreement that we're not in a position to waive and Mr. Bytnar is not in a position to waive, and I would hope you would respect that. Because I'm going -- going to instruct him not to answer any further questions along those lines.

MR. DELLAPORTAS: Well, then I have no further questions.

MR. DICKSON: Thank you.

MS. JACKSON: I do not have any other questions for you, sir. Thank you very much for your time.

THE VIDEOGRAPHER: The time is 5:29. This concludes the deposition.

MS. JACKSON: Mr. DICKSON and Mr. Bytnar, you do have the right to read and sign the deposition or waive that right.

MR. DICKSON: They can be sent here. I'll have him read them. He'll sign them and send them off.

WHEREUPON, the within proceedings were concluded at the approximate hour of 5:29 p.m. on the 25th day of September, 2003.

* * * * *

I, STEPHEN C. BYTNAR, do hereby certify that I have read the above and foregoing deposition and that the same is a true and accurate transcription of my testimony, except for attached amendments, if any.

Amendments attached ( ) Yes ( ) No

____
STEPHEN C. BYTNAR

The signature above of STEPHEN C. BYTNAR was subscribed and sworn to before me in the county of ______________, state of Colorado, this _________ day of ______________________, 2003.

____
Notary Public
My commission expires:

Cargill, Incorporated/9/25/03 (cmb)

REPORTER'S CERTIFICATE

STATE OF COLORADO)
) ss.
CITY AND COUNTY OF DENVER)

I, CAROL M. BAZZANELLA, Registered Professional Reporter and Notary Public, State of Colorado, do hereby certify that previous to the commencement of the examination, the said STEPHEN C. BYTNAR was duly sworn by me to testify to the truth in relation to the matters in controversy between the parties hereto; that the said deposition was taken in machine shorthand by me at the time and place aforesaid and was thereafter reduced to typewritten form, consisting of 135 pages herein; that the foregoing is a true transcript of the

questions asked, testimony given, and proceedings had. I further certify that I am not employed by, related to, nor of counsel for any of the parties herein, nor otherwise interested in the outcome of this litigation.

IN WITNESS WHEREOF, I have affixed my signature this 2nd day of October, 2003.

My commission expires February 10, 2004.

R E P O R T

Investigation of De-icing/Anti-icing Formulation

A Report to: Sears Oil Company Ltd.
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Report No.: 98-B21E-0922 (Interim No. 2)
15 Pages, 2 Appendices

Date: December 11, 1998

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SP 00991

SUMMARY

This report (Task 4) documents the results of Tasks 1 - 3 of a project to investigate the source and identity of the constituents responsible for the ice-melting properties of a product identified as Ice Ban™. The report provides our conclusions to date and recommendations as to the next steps.

Our results indicate:

- Ice Ban™ concentrate itself has negligible ability to both depress the freezing point of water and melt ice when tested by standard procedures.

- However, when Ice Ban™ was blended (1:1 v/v) with 30% (w/w) magnesium chloride, the freezing point depression and ice-melting ability were better than that of the 30% (w/w) magnesium chloride diluted 1:1 (v/v) with deionized distilled water. Thus, in this context, the Ice Ban™ constituents appear to be able to enhance the performance of magnesium chloride. The extent of the improvement was greater than simply the sum of the individual properties of the Ice Ban™/water (1:1 v/v) and 30% (w/w) magnesium chloride/water (1:1). Thus, there appeared to be a synergism between the Ice Ban™ constituents and the magnesium chloride.

- The total solids (soluble and insoluble) in Ice Ban™ concentrate are predominantly organic, i.e. approximately 97% (w/w). The inorganic component (less than 3% w/w) contained predominantly phosphorus, potassium and calcium, with traces of magnesium, silicon and sodium.

- The predominant organic constituents appear to be carbohydrates (approximately 97% w/w) based on glucose as a reference material.

- The Ice Ban™ concentrate, diluted 1:1 (v/v) with deionized distilled water can be separated into several fractions by the addition of increasing concentrations of denatured ethanol (ethanol/methanol - 85:15 v/v). In preliminary tests, five (5) fractions were obtained consisting of four (4) precipitates obtained by a progressive increase in the denatured ethanol concentration (Fractions A - D). The fifth fraction (Fraction E) was soluble in 85% v/v ethanol, the highest concentration of ethanol used.

- Fractions A and E, which contained most of the solids (i.e., 5.3% w/w and 30.7% w/w, respectively), when blended with 30% (w/w) magnesium chloride on an equivalent basis to the original Ice Ban™ concentrate, gave improved freezing point depression of water and ice- melting abilities compared to the reference 30 % (w/w) magnesium chloride diluted with water. The improvements did not match that of the Ice Ban™ concentrate as received which may indicate that the contributions of the components in the respective Fractions may be additive.

- Fraction A was further fractionated with ethanol into water-insoluble components; these materials were rendered insoluble by the addition of denatured ethanol to 50% v/v. The ability of the components to enhance the freeze point depression when blended with 30% (w/w) magnesium chloride was not detected. This may have been due to the fact that the materials precipitated by ethanol did not go completely back into aqueous solution or, alternatively, it may indicate another synergistic effect. It is

also possible that the contact with ethanol may have caused some denaturation of the soluble proteinaceous components, preventing their redissolving in water.

- Fractions C to D, appeared to be more gum-like and may consist of polysaccharide types of molecules.

- Ice Ban™ concentrate, when diluted 1:1 (v/v) with deionized distilled water did not exhibit any anticorrosion properties. However, the blend of Ice Ban™ concentrate/30% (w/w) magnesium chloride (1:1 v/v), i.e., Ice Ban Magic, had a lower corrosion rate than the 30% (w/w) magnesium chloride diluted 1:1 v/v with deionized distilled water.

Based on these preliminary results, there does not appear to be any unique component responsible for the ability of Ice Ban™ concentrate to enhance the ice melting ability of magnesium chloride. A limited number of confirmation tests are recommended. These would seek to:

1. Repeat the ethanol fractionation, with and without the initial removal of the water-insoluble solids in the Ice Ban™ concentrate. Particular emphasis would be placed on confirming the respective abilities of Fractions A and E to enhance the performance of magnesium chloride.

2. Confirm the average molecular weight of the components soluble in the 85% (v/v) denatured ethanol (Fraction E). This would involve both chemical and column chromatographic techniques. It is anticipated that these will be predominantly low molecular weight compounds.

3. Identify the saccharides present in Fraction E.

4. Confirm that Fractions B - D are, as suspected, polysaccharides. This should be important since they may offer some beneficial film forming effects. Related to this would be the completion of some tests to identify if these components are solely carbohydrates or possibly glycoproteins.

5. Confirm the approximate molecular size of the respective fractions so that a membrane separation technique can be optimized. This is recommended because of the possibility that the exposure to ethanol may change the solubility and hence properties of certain fractions in water.

INTRODUCTION

This report describes data obtained on the product Ice Ban™ in accordance with the work program outlined in Proposal No. 98-1-02-02-01-P8231-FI and the modifications to Task 2 of the experimental program as approved by Sears Oil.

The samples, received at ORTECH on July 31, 1998, were catalogued as follows:

ORTECH Sample No.	Client Identification
98-B21E-0922-01	NATX 71578 Ice Ban™ (S.G. 1.22)
98-B21E-0922-02	Mag. 2 (Magnesium Chloride 30% w/w)

In the main text of this report, the sample numbers will be shortened to 0922-01 and 0922-02, respectively.

The results of Task 1 were reported previously in Interim Report No. 1. This report (Task 4) focuses on the results of Tasks 2 and 3 of the proposal. Some of the data in Interim Report No. 1 have been included in this report to assist in the interpretation of the current data.

PROCEDURE

TASK 2. FRACTIONATION OF THE ICE BAN™

In a preliminary test, it was noted that when denatured ethanol (ethanol:methanol - 85:15 v/v) was added to the Ice Ban™ concentrate, as received, a thick gum/precipitate formed. When, the denatured ethanol was added slowly to Ice Ban™, diluted with water (1:1 v/v), a precipitate formed which could be isolated. On the addition of denatured ethanol to the clear filtrate, more precipitate formed, hence this procedure appeared to offer a simple approach to achieving a preliminary fractionation of the constituents.

First Ethanol Fractionation

In a larger scale test, Ice Ban™ concentrate (198.6 g) was diluted with an equal volume of deionized distilled water (DDW) to approximately 400 mL. Denatured ethanol was added stepwise in aliquots of 200 mL until a total of 600 mL had been added. The mixture was left to stand for not less than 16 hours at 4°C and the precipitate obtained was recovered by filtration of the suspension using a coarse frit glass filter. The precipitate was sucked dry of most of the residual ethanol and was then dissolved/ suspended in DDW and made up to close to the original weight of Ice Ban™ concentrate using DDW. The resultant suspension (Fraction A, i.e. 0922-01-02A) was retained for

testing. Further volumes of denatured ethanol (300 mL) were added sequentially to the clear brown filtrate (780 mL) after removing Fraction A.

After each addition, the mixture was left at 4°C for 16 - 48 hours until the resulting precipitate had settled. The precipitate, in each instance, was recovered by either filtration using a coarse glass frit (Fractions B and D) or by decantation (Fraction C). Fraction C took a long time to settle and formed a tenacious gum-like film on the bottom of the flask. In each instance, most of the residual ethanol was removed from the precipitate by either extended vacuum filtration or by passing a stream of nitrogen gas across the surface of the precipitate.

The final fraction (Fraction E) was the component that remained soluble in the highest concentration of ethanol (i.e., approximately 85% v/v). Fraction E was recovered by heating gently while at the same time directing a stream of nitrogen gas across the surface of the liquid to accelerate the rate of removal of the volatile solvent. The final reduced volume was approximately 75 mL and this solution was heated in a oven to approximately 95°C to complete the removal of the ethanol.

DDW was added to all isolated suspensions/solutions to approximate the starting weight of the Ice Ban™ sample, i.e., so that the solids from that fraction were present at close to the same concentration (w/w) as in the undiluted Ice Ban™. The solids concentration in each suspension/solution was determined by drying an aliquot at 102°C.

Samples were prepared for testing by blending one volume of the solution of the isolate with an equal volume of the 30% (w/w) magnesium chloride (Sample No. 0922-02). The freeze points of the respective solutions/suspensions (15% w/w magnesium chloride in water) were determined as described in Task 1 (Interim Report No. 1).

Fractions A and E showed the presence of significant amounts of components able to depress the freezing point of the 15% magnesium chloride.

The solids content of each Fraction (A to E) was determined gravimetrically and the percent ash was measured after combustion at 600°C. The total carbohydrate content of each fraction was also determined by the anthrone/sulphuric acid procedure.

Second Ethanol Fractionation

It was noted that when Ice Ban™ concentrate was diluted (1:1 v/v) with water, a precipitate settled out on storage (i.e., at 4°C). Fraction A in the initial fractionation would contain these water-insoluble materials. In a second test, a 50 mL sample of the Ice Ban™ (60.2705 g) was diluted with 50 mL DDW. The suspension was centrifuged at approximately 13,000 rpm for ten minutes. The precipitate was retained (Sample 0922-01-03-A1). Denatured ethanol (100 mL) was added to the clear, brown filtrate (100 mL). A precipitate formed and the mixture was left at 4°C for 72 hours prior to recovering the precipitate by centrifugation (13,000 rpm for 10 minutes). The precipitate (Sample No. 0922-01-03-A2) was allowed to stand at room temperature to evaporate most of the remaining solvent. Both precipitates were dissolved/dispersed in DDW and made up to a weight close to the original weight of the sample of Ice Ban™ concentrate. As in the first series of fractionation experiments, the intent was to match the solids content of the isolated fractions to their concentrations in the original concentrate. Blends (1:1 v/v) of each suspension were prepared with the magnesium chloride (30% w/w). The freeze points and ice melting abilities of the blends were determined.

Freezing Point Determination

The freezing points of the diluted solutions/suspensions were determined according to ASTM Method D 1177-94, Standard Test Method for Freezing Point of Engine Coolants. Each sample was analyzed using a volume of 70 - 80 mL.

Ice Melting Test

The ice melting ability of each solution/suspension was determined using a modified version of Method SHRP H205-2, Test Method for Ice Melting of Liquid Deicing Chemicals. SHRP-H-332, Handbook of Test Methods for Evaluating Chemical Deicers, Chappelow, McElroy, Darwin, de Noyelles and Locke, Strategic Highway Research Program, National Research Council, Washington, DC, 1992.

In Task 2, the mixtures to be evaluated were tested at -3 to -4°C using starting volumes of approximately 4 mL. This temperature appeared to offer larger differences in volumes of brines and by reducing the volume of deicing mixture to 4 mL, the volume of brine generated in the test did not exceed 20 mL and it was possible to extend the test interval to 60 minutes (cf. observations in Interim Report No. 1).

TASK 3. CORROSION TESTS

Corrosion tests were carried out according to Method SHRP H-205-7, Test Method for Evaluation of Corrosive Effects of Deicing Chemicals on Metals (SHRP-H-332, Handbook of Test Methods for Evaluating Chemical Deicers, Chappelow, McElroy, Darwin, de Noyelles and Locke, Strategic Highway Research Program, National Research Council, Washington, DC, 1992).

The solutions tested were 15% (w/w) magnesium chloride, Ice Ban Magic, 30% w/w magnesium chloride and Ice Ban™ concentrate and 15% (w/w) sodium chloride. As noted in Interim Report No. 1, the Mag 2. solution (ORTECH Sample No. 97-B21E-0922-02) had a definite brown colour that was attributed to a slight degree of contamination with the Ice-Ban™ product. To eliminate the possibility of any interference by the organic contaminant in the corrosion tests, magnesium choride solutions used in this test were prepared from laboratory grade chemicals. Carbon Steel coupons, C1018, 0.02%C were used with the systems being aerated. A more detailed description of the test protocol is given in Report No. 98-J41-M0344, attached as the Appendix to this report.

RESULTS AND DISCUSSION

In Interim Report No. 1, it was identified that the addition of the Ice Ban™ components lowered significantly the freezing point of the 15% (w/w) magnesium chloride solution from -22.7°C to approximately - 35.5°C, Ice melting tests confirmed the observations from the freezing point tests in that the presence of the Ice Ban™ increased the ice melting ability of magnesium chloride solution. However, ice melting ability was not detectable in Ice Ban™ alone at even a temperature as high as - 4°C. Thus, as with the freezing point tests, it was concluded that the improvement with Ice Ban Magic blend could not be attributed directly to the additive action of the Ice Ban™ and magnesium chloride.
The Ice Ban™/water blend showed an initial freezing point at -2.3°C but a portion of the sample remained fluid. Subsequent freezing/solidification did ~~occur at lower~~ zones within the test system but these were not detected in the temperature of the mixture which remained constant at -2.3°C. Thus, although the Ice Ban™ did appear to contribute to lowering the freezing point of magnesium chloride solution, the performance of the Ice

Ban™/magnesium chloride blend appeared to be greater than simply the sum of the individual abilities of the respective components (i.e., the Ice Ban™/water - 1:1 v/v and 30% (w/w) magnesium chloride/water - 1:1 v/v).

From the Task 1 data, it appeared that both the freezing point and ice melting tests could evaluate the ability of Ice Ban™ or fractions derived from it to modify the properties of 30% (w/w) magnesium chloride diluted 1:1 (v/v) with deionized distilled water (DDW). Accordingly, these two tests were used in Task 2 to evaluate various isolates.

We have continued to improve the ice melting test system. Conducting the test at -3 to -4°C yielded larger volumes of brine and hence improved the accuracy of the measurements. In Task 2, however, the volume of test solution applied to an ice surface was reduced to approximately 4 mL in order to keep the maximum volume of brine observed in a test below 20 mL, even when the test was extended to 60 minutes. It was noted, however, that at -3 to -4°C, the position of the test dishes within the chamber could influence the volumes of brine generated by the same solution. Thus, a fixed location was selected for the dishes to minimize such variations.

The objective of Task 2 was to identify if it was possible to fractionate the Ice Ban™ concentrate as a first step towards identifying which component(s) of the Ice Ban™ concentrate are responsible for its beneficial action. Membrane separation was proposed in the initial protocol but based on the preliminary tests on fractionation with ethanol, a revised strategy was proposed and approved by Sears Oil.

When undertaking the fractionation of the Ice Ban™ constituents, it was necessary to initially dilute the product with water. Adding denatured ethanol to the concentrate yielded a thick gum-like mass with little fractionation being observed. The results of the

first fractionation experiment with denatured ethanol (85% ethanol:15% methanol) are summarized in Table 1. For screening of isolates for ice melting abilities, the approach taken to standardize the test samples was to dissolve/disperse the isolated material in DDW and restore the weight of the reconstituted solution/suspension to the original weight of Ice Ban™ concentrate taken for the test. Thus, the relative proportion (% solids) of an isolate would be similar to that in the original concentrate. The only caution is that the proportion of water would be substantially higher in those fractions with low solids content. The data on the solids content (% w/w), ash (% w/w) and total carbohydrate (% w/w) relate to the reconstituted solutions/suspensions.

Fraction A appeared to be predominantly a suspension of particles in water. A slight darkening and clearing of the suspension was noted when it was blended with an equal volume of the 30% (w/w) magnesium chloride. This may have been due to some interaction between the insoluble solids and the inorganic species.

The second fractionation with denatured ethanol focused on Fraction A. In the initial experiment, the precipitate recovered as Fraction A included the water-insoluble solids in the Ice Ban™ concentrate as received as well as any soluble material precipitated when the ethanol concentration was increased to approximately 60% (v/v). In the second experiment, the denatured ethanol concentration was only raised to 50% (v/v). As shown in Table 2, the results for Fraction A constituents were not consistent with those of the original Fraction A (Table 1).

Thus, negligible change of the freeze point depression ~~of water was noted~~ with either constituent when blended (1:1 v/v) with 30% (w/w) magnesium chloride. This was contrary to the performance of Fraction A from the initial fractionation (cf. Tables 1 and 3) where the improvement of the freeze point depression was achieved by the relatively

low total solids content of reconstituted Fraction A. These data need to be confirmed. A point of note was the the fact that in the second experiment, the material precipitated from solution by the denatured ethanol did not redissolve well in water, possibly due to denaturation. This may have contributed to the difference in performance and would need to be checked by using a technique such as membrane separation which would not expose the components to the possible effect of the ethanol. Another possibility for the 'loss' of performance enhancement in the second series of tests is that a necessary interaction between the two isolates had been lost.

Fractions B, C and D (precipitated by approximately 74% (v/v), 82% (v/v) and 85% (v/v) denatured ethanol, respectively) appeared quite gum-like after evaporation of the residual solvent. They all dissolved when reconstituted in water and are suspected to be polysaccharide types of molecules. Additional tests are needed to confirm this, e.g., by establishing their average molecular weights by either chemical techniques or gel permeation chromatography. It would also be advisable to check for the presence of any glycoproteins. The latter types of molecule have, in certain biological systems been identified to depress the freezing point of water or possibly modify the ice crystal formation process. Although none of these fractions exhibited independently any major enhancement of the properties of the magnesium chloride, they may contribute to properties such as viscosity modification and/or film formation.

Fraction E (soluble in 85% v/v denatured ethanol) contained approximately 70% of the total solids present in the Ice Ban™ concentrate as received. It was predominantly carbohydrate which, based on the solubility characteristics, would appear to be lower molecular weight saccharides. Certain sugars, monosaccharides and disaccharides are known to affect the freezing pattern of water. Accordingly, they are used as cryoprotectants in techniques such as freezedrying to prevent damage to sensitive

biologicals and micro-organisms. This effect has been attributed to the sugars binding the water and helping to prevent the formation of ice crystals. This may be a possible role for the carbohydrates in Ice Ban™. Sugars differ in there abilities to act as cryoprotectants and a recommended next step would be to identify if any unique sugars (monosaccharides, disaccharides or oligosaccharides) may be predominant in this fraction. This would involve techniques such as thin layer chromatography and high performance liquid chromatography (HPLC).

The corrosion test data (Appendix) also indicated that the Ice Ban™ concentrate appeared to offer some improved corrosion resistance when blended with the 30% (w/w) magnesium chloride. This appeared to involve the formation of a film but no such effect was noted when mixed (1:1 v/v) with water. Although the 30% (w/w) magnesium chloride appeared to be least corrosive in the test system, the anti-corrosion benefits noted upon blending the Ice Ban™ concentrate with the magnesium chloride may be a more accurate reflection of the field conditions as the creation of brine will serve to dilute the magnesium chloride solutions coming in contact with metals.

CONCLUSIONS AND RECOMMENDATIONS

The overall interpretation of the data obtained to date is complex. Although, it is concluded from these preliminary tests that Ice Ban™ does improve the ice melting properties of magnesium chloride solution, in the tests used, there was no evidence of ice melting ability in aqueous solutions containing only Ice Ban™. Thus, the improvement would seem to involve a synergism between the magnesium chloride and the Ice Ban™. The properties of Ice Ban™ concentrate appear to be an additive effect of a range of components, largely carbohydrates.

It is concluded that:

1. The predominant constituents in the Ice Ban™ are organic, namely carbohydrates.
2. Inorganic components, as indicated by the ash residues, constitute a small proportion (i.e., less than 3% w/w) in the original concentrate.
3. Fractionation with denatured ethanol has indicated that the benefits attributed to the Ice Ban™ could be associated with specific fractions but that contact with the ethanol may lead to some denaturation of sensitive constituents.
4. Certain fractions (Fractions A and E obtained by ethanol fractionation) appeared to contain a higher proportion of active constituents than others.
5. The most active fraction (Fraction E) contained the carbohydrate components that were most soluble in ethanol, presumably the lower molecular weight materials.
6. The observed benefits may be the collective action of a range of carbohydrate constituents in the Ice Ban™. As fractions are isolated, e.g., as noted when Fraction A was separated further, the beneficial effects could be lost. These observations need to be verified by repeating the preliminary experiments or by using alternative techniques such as membrane separation.
7. Fractions B to D, while showing a high proportion of carbohydrates, may be polysaccharides and contribute to some of the viscosity modifying/film forming benefits suggested for Ice Ban™.
8. Ice Ban™ concentrate does offer some anti-corrosion benefits when blended with 30% (w/w) magnesium chloride. This is thought to be due to the formation of a film on the steel surface. Similar benefits were not noted with samples diluted with water.

Accordingly, it is proposed that the next steps should be:

1. Repeat the ethanol fractionation experiments with and without the removal of the water-insoluble components in the Ice Ban™ concentrate as received; however, in view of the similarity in the appearance of Fractions B, C and D, these would be combined and treated as one fraction.
2. Confirm the average molecular weights of the carbohydrates in each fraction by both chemicai analysis and size exclusion chromatography.
3. Verify if Fractions B - D contain glycoproteins.
4. Establish the predominant saccharides in Fraction E.
5. Based on the molecular weight information carry out a separation of the constituents by molecular size using selective membranes. Test the isolates for performance enhancement of magnesium chloride.

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APPENDIX I: Tables

(3 Pages)

Table 1. Evaluation of Isolates Obtained by Ethanol Fractionation

Sample No. (98-B21E-)	Description	Weight (g)	Solids (% w/w)	Ash (% w/w)	Total Carbohydrate (g)	Freeze Point * (°C)
0922-01-02	Ice Ban™ Concentrate	198.6	43.6	2.88**	43.1	- 35.5
0922-01-02A	Precipitate with 60% v/v EtOH***	198.6	5.3	0.49	3.8	- 27.4
0922-01-02B	Precipitate with 74% v/v EtOH	198.5	3.7	0.14	3.2	- 23.8
0922-01-02C	Precipitate with 82% v/v EtOH	199.0	2.8	0.15	2.1	- 23.5
0922-01-02D	Precipitate with 85% v/v EtOH	198.6	1.3	0.12	0.6	- 23.3
0922-01-02E	Soluble in 85% v/v EtOH	198.6	30.7	0.45	29.8	- 30.4

* 1:1 (v/v) blend of isolate solution/suspension with 30% (w/w) magnesium chloride;
Mean Freeze Point blend of (1:1 v/v) of 30% (w/w) magnesium chloride: water = -22.4°C

** Predominant elements by SEM/EDX were P, Ca, K, and traces of Si, Mg and Na

*** EtOH refers to concentration of denatured ethanol (i.e., ethanol/methanol blend)

Table 2. Evaluation of Isolates Obtained by Ethanol Fractionation - Fraction A

Sample No. (98-B21E-)	Description	Weight (g)	Solids (% w/w)	Total Carbohydrate (g)	Freeze Point * (°C)
0922-01-03-A1	Water-Insoluble Components	60.25	5.89	4.58	- 23.4
0922-01-03-A2	Precipitate with 50% v/v EtOH**	60.27	1.32	0.29	- 23.4

* 1:1 (v/v) blend of isolate solution/suspension with 30% (w/w) magnesium chloride;
Mean Freeze Point of blend (1:1 v/v) of 30% (w/w) magnesium chloride: water = -22.4°C
** EtOH refers to concentration of denatured ethanol (i.e. ethanol/methanol blend)

Table 3. Results of Ice Melting Tests at -3 to -4°C on Isolates from Ethanol Fractionation

Sample	Mean Brine Collected (mL/g De-icer)			
	15 Min.	30 Min.	45 Min.	60 Min.
0092-01-02A	2.954	3.369	3.541	3.777
0092-01-02E	2.809	3.246	3.567	3.793
0092-02-01	2.581	2.992	3.237	3.417

0092-01-2A = Fraction A/30% (w/w) $MgCl_2$ - 1:1 (v/v)

0092-01-2B = Fraction E/30% (w/w) $MgCl_2$ - 1:1 (v/v)

0092-02-1 = 30% (w/w) $MgCl_2$/water (1:1 v/v)

APPENDIX II: Corrosion Test Report

(5 Pages)

Measurement of the Freezing Point Depression of Additional Mixtures

Report to:	~~Sears Oil Co. Inc.~~ 1914 Black River Blvd. Rome, New York 13440 USA
Attention:	David H. Wood Vice-President
Telephone: Facsimile:	(315) 337-1232 (315) 337-0117
Submitted by:	Brian White, Ph.D. Patrick Williams, B. Sc., C.Chem. Pharmaceutical Development
Report No.:	98-B21E-0922 (Interim 3) 5 Pages
Date:	December 31, 1998

ORTECH

ORTECH Corporation, 2395 Speakman Dr., Mississauga, Ontario, Canada L5K 1B3 Phone: (905) 822-4111 Fax: (905) 823-1446

SP 01019

1. INTRODUCTION

Recently, ORTECH reported (ORTECH Report No. 98-B21E-0922 - Interim 1) that a blend (1:1 v/v) of the existing product and magnesium chloride (30% w/w) displayed superior de-Icing properties to that of magnesium chloride (30% w/w) diluted (1:1 v/v) with deionized distilled water. A freezing point depression (FPD) value of -35.5°C was reported for the existing product/magnesium chloride (30% w/w) mixture, compared with -2.3°C for existing product and -22.7°C for $MgCl_2$ diluted with water (1:1v/v). The existing product/magnesium chloride (30% w/w) blend also demonstrated a superior ice-melting ability. Thus, in this context, the existing product constituents appear to be able to enhance the performance of the aqueous magnesium chloride (15% w/w) solution. The extent of the improvement was greater than the sum of the individual FPD values of existing product/water (1:1 v/v) and 30% (w/w) magnesium chloride/water (1:1). Synergism between the existing product constituents and the magnesium chloride produced an additional 10°C drop in the freezing point of the solution.

The FPD value for the existing product/magnesium chloride (30% w/w) blend suggested that the existing product in the presence of $MgCl_2$ also plays a role in lowering the freezing point of the aqueous solution. This work aimed to investigate the broader application of this de-icing behaviour by measuring the freezing point depression of ten additional formulations and the reference aqueous $MgCl_2$ (15% w/w) solution. The mixtures in this study consisted of $MgCl_2$ (15 % w/w), a polymeric component and water. Magnesium chloride is believed to act as the primary freezing point depressant, the macromolecular component as a film forming agent immobilizing the inorganic salt and water as the solvent.

The freezing point depression curves of these synthetic blends were determined as previously described in ORTECH Report No. 98-B21E-0922 (Interim 1).

2. EXPERIMENTAL

The freezing point depression of ten mixtures were determined by using the same experimental protocol described in ORTECH report No. 98-B21B-0922 (Interim 1). The weights of the various components used to prepare the mixtures are shown in Table I. Approximately twice the mass of magnesium chloride hexahydrate ($MgCl_2 \bullet 6H_2$) was needed to produce aqueous solutions with a final concentration of 15% by weight $MgCl_2$. With exception to the reference $MgCl_2$ solution (duplicate measurement), the reported freezing point depression values are based on a single measurement.

The classes of so-called "film forming" agents that were investigated included cellulosic derivatives, oligosaccharides, various natural gums, poly(vinyl alcohol) and molasses.

Table I: Recipes for the Eleven Synthetic De-Icing Formulations

Type of Compounds	Weight of Compound (g)	Weight of Water (g)	Weight of $MgCl_2.6H_2O$ (g)
HEC 250 HHR	1.0	205.0	77.1
HEC 250 HHR	1.0	205.0	97.0
HPMC K15M	0.9	165.0	60.1
CMC	2.0	134.0	64.0
Dextrin	10.0	125.0	63.5
Maltodextrin 5	10.0	125.0	63.5
Maltodextrin 15	19.3	125.0	67.9
Gum Arabic	7.0	125.0	62.1
Tragacanth 470 Powder	0.4	134.6	63.5
PVA Airvol 325	6.8	165.0	80.8
Molasses	27.4	72.0	46.3
$MgCl_2 \bullet 6H_2O$	----	302.0	526.4

Abbreviations for the cellulosic derivatives are as follows:
HEC 250 HHR: hydroxyethylcellulose (NATROSOL)
HPMC K15M: hydroxypropylmethylcellulose (METHOCEL K15M, DOW CHEMICAL)
CMC: sodium carboxymethylcellulose
PVA: poly(vinyl alcohol)

Other reagents that were investigated, but which precipitated out of solution when the aqueous magnesium chloride (1:1 w/w) solution was added included poly(acrylic acid) and gluten. Precipitation may have been due to interactions between acid groups or other electron donor groups on the macromolecule and Mg^{+2}. In the case of gluten, precipitation may also have been due to a salting out effect, rather than complexation interactions.

3. RESULTS AND DISCUSSION

The freezing point depression of ten ternary systems and one binary mixture (reference $MgCl_2$ solution) was determined by using the same experimental protocol outlined in ORTECH Report No. 98-B21E-0922 (Interim 1). The $MgCl_2$ content in each of the formulations was about 15% by weight. The macromolecular content of the mixture varied from about 0.3% w/w for hydroxyethylcellulose (HEC 250 HHR) to about 19% w/w for molasses. A summary of the de-icing formulations and the freezing point depression values are shown in Table II. The classes of so-called "film forming" agents that were investigated included cellulosic derivatives, oligosaccharides, various natural gums, poly(vinyl alcohol) and molasses.

Clear performance differences existed between the various formulations. The gums and cellulosic derivatives displayed little, if any, additional contribution to lowering the FDP value. These formulations had freezing point depression (FPD) values ranging from -14.2°C for the system containing poly(vinyl alcohol) (PVA) to -19.6°C for the system prepared from Tragacanth gum. The reference $MgCl_2$ (15% w/w) aqueous solution displayed a FPD value of -15.9°C. Molasses and maltodextrin 15 showed the lowest FPD values of -24.9°C and -27.3°C, respectively.

Table II: Summary of the De-icing Formulations and Corresponding Freezing Point Depression Values

Reagent	Reagent		Water		$MgCl_2 \cdot 6H_2O$		Viscosity Ford Cup	Freezing Point Depression
	mass	% w/w	mass	% w/w	mass	% w/w	sec	°C
HEC 250 HHR	1.0	0.35	205.0	72.4	77.1	27.2	18	-13.7
HEC 250 HHR	1.0	0.33	205.0	67.7	97.0	32.0	18	-17.1
HPMC K15M	0.9	0.4	165.0	67.6	60.1	32.0	16	-21.5
CMC	2.0	1.0	134.0	67.0	64.0	32.0	17	-16.4
Dextrin	10.0	5.4	125.0	62.6	63.5	32.0	12	-20.4
Maltodextrin 5	10.0	5.4	125.0	62.6	63.5	32.0	13	-20.4
Maltodextrin 15	19.3	9.8	125.0	59.2	67.9	32.0	11	-27.3
Gum Arabic	7.0	3.6	125.0	64.4	62.1	32.0	11	-18.8
Tragacanth 470 powder	0.4	0.2	134.6	62.6	63.5	32.0	14	-19.6
Alginic Acid	4.0	2.5	104.8	65.5	51.2	32.0	11	
AIRVOL 325	6.8	2.9						-14.2
Molasses	27.4	18.8	72.0	49.4	46.3	31.8	13	-24.9
Aqueous $MgCl_2$ (15% w/w) reference solution							16	-15.9

The concentration of the polymeric component was adjusted such that the viscosity of the solution, as measured by the Ford cup method, fell within the same range. These flow times are not be directly related to viscosity values. They simply represent the time required for a known volume of solution to flow through an orifice of a given diameter, and as such represent approximate values only.

4. CONCLUSIONS

The macromolecular component of the mixture has been shown to influence the value of the freezing point of an aqueous $MgCl_2$ solution. In many cases however, the effect was rather small resulting in an additional lowering of the freezing point value by less than 5°C.

Maltodextrin 15, an oligosaccharide, and molasses displayed the lowest freezing point depression values. From this limited survey of systems, lower molecular weight species appear to produce the greatest influence on the freezing point of the solution.

The cellulosic derivatives and the natural gums had freezing point values in the -17°C to -20°C range. A value of -15.9°C was obtained for the reference aqueous $MgCl_2$ solution.

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for
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JC511 U.S. PTO
09/224906
01/04/99

Class	Subclass

ISSUE CLASSIFICATION

[redacted]

PATENT NUMBER

U.S. UTILITY PATENT APPLICATION

O.I.P.E. KML

SCANNED Ck.l Q.A. Nu

PATENT DATE

SECTOR	CLASS	SUBCLASS	ART UNIT	EXAMINER
	252	70	1755	

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09/224,906	01/04/99	252	1755	781_002NP

APPLICANT

ROBERT A. HARTLEY, ONTARIO, CANADA; DAVID H. WOOD, ROME, NY.

CONTINUING DOMESTIC DATA*******************
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371 (NAT'L STAGE) DATA*******************
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Foreign Priority claimed ☐yes ☐no 35 USC 119 (a-d) conditions met ☐yes ☐no ☐Met after Allowance Verified and Acknowledged ______ Examiner's Initials ______ Initials	STATE OR COUNTRY	SHEETS DRAWING	TOTAL CLAIMS	INDEPENDENT CLAIMS
	CAX	0	23	9

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TITLE

DEICING SOLUTION

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Repln. Ref: 05/05/1999 SBLIZZAR 0011385400
DA#:500289 Name/Number:09224906
FC: 704 $641.00 CR

05/05/1999 SBLIZZAR 00000005 09224906

01 FC:201	380.00 OP
02 FC:202	234.00 OP
03 FC:203	27.00 OP

01/14/1999 DBUTLER 00000033 09224906

01 FC:101	760.00 OP
02 FC:102	468.00 OP
03 FC:103	54.00 OP

Adjustment date: 05/05/1999 SBLIZZAR
01/14/1999 DBUTLER 00000033 09224906

01 FC:101	-760.00 OP
02 FC:102	-468.00 OP
03 FC:103	-54.00 OP

PTO-1556
(5/87)

01/04/99 1:52 U.S. PTO

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Practitioner's Docket No. 781_002NP

PATENT

NEW APPLICATION TRANSMITTAL

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I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 addressed to the Box Patent Application, Assistant Commissioner for Patents, Washington D.C. 20231 on January 4, 1999.

Box Patent Application
Assistant Commissioner for Patents
Washington D.C. 20231

Transmitted herewith for filing is the patent application of:

Inventors: Robert A. Hartley and David H. Wood

For: DEICING SOLUTION

Enclosed are:

1. Papers enclosed that are required for filing date under 37 CFR 1.53(b) (Regular) are:

   9 Page(s) of Specification
   5 Page(s) of Claims (1-23)
   1 Page(s) of Abstract
   _ Sheets of Drawings

☒ Prior to examination of the above-identified application, amend the specification at Page 1, after the title, by inserting the following:

--CROSS REFERENCE TO RELATED APPLICATION
Reference is made to and priority claimed from U.S. Provisional Application Serial No. 60/070,636 filed January 7, 1998 entitled "DEICING SOLUTION"

2. ☐ A Preliminary Amendment

3. ☐ A combined Declaration and Power of Attorney

4. ☐ A Small Entity Statement

5. ☐ A certified copy of

6. ☐ An Information Disclosure Statement

7. ☐ PTO Form-1449

8. ☐ An Assignment Transmittal and Assignment of the invention to

9. ☒ The filing fee has been calculated as shown below:

For	No. Filed	No. Extra	Rate	Fee
Basic Fee				$760380.00
Total Claims	23	3	x $ 18.00	54.00
Indep Claims	9	6	x $78.00	468.00
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- ☒ Any additional filing fees required under 37 CFR 1.16.
- ☐ Any patent application processing fees under 37 CFR 1.17.

Respectfully submitted,

WALL MARJAMA BILINSKI & BURR

Date: January 4, 1999

By: [signature]
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DEICING SOLUTION

Background of the Invention

The current state of the art for coping with snow and ice on roads usually involves applying a deicer material such as a salt to the road surface. Sometimes antiskid materials such as sand or other aggregates such as gravel are added with or without a salt.

The use of salt and salt containing compositions having high concentrations of salt, cause an undesirable corrosive effect on vehicles, the road surface, and the environment with respect to the run off of water containing salt which contaminates the surrounding land and water.

Considering the above problems associated with the addition of salt formulations, there has been a continuing need for a deicing composition or formulation which can effectively melt snow and ice yet which reduces the corrosion and environmental contamination referred to above. In response to the above problems associated with the use of road salt, the prior art has looked to alternative formulations which are less corrosive and more environmentally friendly.

U.S. Patent 5,635,101 (Janke et al.) relates to a deicing composition containing a by-product of a wet milling process of shelled corn. Corn kernels are steeped or soaked in a hot solution containing small amounts of sulfurous acid. The corn kernels are separated from the steep water and steep water solubles are used in the production of a deicing composition.

U.S. Patent 4,676,918 (Toth et al.) relates to a deicing composition which comprises a mixture containing at least one component selected from a number of chlorides or urea and an admixture of waste concentrate of alcohol distilling that has a dry substance content of from 200 to 750 g/kg and from 10% to 80% by weight of water.

Both Janke et al. and Toth et al. materials are naturally occurring substances with hundreds (if not thousands) of components such as complex carbo-hydrates, starches, sugars, proteins etc. and are normally used with a salt. These materials essentially immobilize the salt by either forming a dry film, or at low temperatures, an adhesive, sticky layer due to the resulting large increase in viscosity.

The above de-icing solutions now being introduced in the field employ agricultural residues e.g., corn based distillers solubles, brewers condensed solubles and solubles from the corn wet milling industries steep water. These naturally occurring substances are extremely variable in composition, viscosity, film forming tendency, freezing temperature, pH etc., and consequently give varying performance when used in de-icing solutions. Depending upon the source and batch, these materials at low temperatures sometimes exhibit such resistance to flow that they cannot be effectively applied evenly to a road surface, rendering them virtually unsuitable for use.

To improve quality and performance, and to meet current mandated standards, there is an immediate need for synthetic, chemically modified and naturally occurring film formers, and carefully purified naturally occurring materials for freezing point depressants, which can be substituted for the currently used agricultural residues. Such a formulation would improve performance and reduce metal corrosion, spalling of concrete, toxicity and overcome environmental concerns.

It is therefore an object of the present invention to provide a deicing formulation which exhibits improved performance standards which overcomes the prior art problems described above.

It is a further object of the present invention to provide a deicing formulation which provide consistent physical and chemical properties and exhibit less corrosion.

It is another object of the present invention to provide an economical, highly effective deicing formulation.

Summary of the Invention

The present invention is based upon the discovery that the use of a combination of three key components in a deicing formulation overcomes the problems of the prior art described above. The three components comprise a

freezing point depressant, film former and water. These film formers are water soluble and water resoluble, and preferably comprise colloidal or emulsion materials dissolved in water. The freezing point depressants 'melt' the ice and snow and keep the resulting ice/snow/de-icer/ water layer liquid down to known (and defined) lower temperature limits, aiding removal and improving road safety. The film former immobilizes the freezing point depressant onto the road surface (preventing run-off), improves efficiency of ice melting, and can reduce metal corrosion down to acceptable levels. The freezing point depressants include conventional salts and selected organic materials used alone or in admixture.

Detailed Description of the Invention

The present invention relates to a deicing formulation which includes as its key components a freezing point depressant, a film former and water. The freezing point depressant may comprise any suitable inorganic or organic material and mixtures thereof. Suitable materials includes chlorides such as NaCl, $CaCl_2$, $MgCl_2$, and KCl. Also included are sodium acetate, potassium acetate, and calcium magnesium acetate. Suitable organic substances include urea and urea derivatives, glycerols, glycols, sugars (hexoses, saccharides), citric acid, lactic acid, primary alcohols, secondary alcohols, tertiary alcohols, glycol-ethers. Generally the freezing point depressant is present in the concentration of about 5 to 30 wt. % of the formulation depending upon the temperature demands dictated by the region in which the formulation is used.

The film former of the present invention comprises any suitable water soluble or water resoluble material, and preferably comprises colloidal and/or emulsion materials which are dissolved and/or dispersed in water. A group of suitable film formers for use in the present invention comprise:

- cellulosic derivatives e.g. sodium carboxy methyl cellulose, methyl cellulose, hydroxy ethyl cellulose, hydroxy propyl cellulose, hydroxy ethyl cellulose, hydroxy propyl methyl cellulose.
- polyvinyl alcohol and copolymers
- polyvinyl acetate and copolymer emulsions
- styrene - butadiene emulsions

- urea/formaldehyde and melamine/formaldehyde condensates
- polyacrylates and copolymer emulsions
- modified polysaccharides (ethylene oxide or propylene oxide)
- xanthan gums
- polyesters e.g. water soluble alkyds
- maleic anhydride modified resins and oils
- starches, starch ethers, dextrins
- alginates
- natural gums e.g. gum acacia, seaweed extracts
- caseins, zeins and derivatives.

The above materials can be used alone or in admixture

These film formers are selected to provide predictable performance and consistent properties from batch to batch which are presently not available with prior art formulations. They provide a predictable viscosity, film forming tendency, pH, and freezing point which allow them to be tailor made for particular applications which address the severity of weather conditions and type of road surface being treated. The organic film formers also act to depress the freezing point although they are not as efficient as inorganic salts.

A freezing point depressant melts the ice and snow keeping the resulting ice/snow/deicer/water layer liquid down to predetermined lower temperature limits, aids in clearing the road surface and provides for improved road safety conditions. The film former immobilizes the freezing point depressant onto the road surface thus preventing run-off. It is itself a freezing point depressant and so further improves the efficiency of ice melting and aids in the reduction of metal corrosion up to an acceptable level not attainable with present deicing formulations.

Table I below illustrates a typical operating range of formulations falling within the present invention along with typical pH and viscosity values.

Table I	
	% by weight
Thickener/Colloid/emulsion (solids)	0.15 to 30
Salt and/or freezing point depressant	5 to 30
Water	40 to 90
pH	5 to 9
Viscosity	0.1 to 3 poises at 25°C (77°F)

An optional additive which may be used with the composition of the present invention includes a non-ionic and/or anionic surfactant in a concentration of about 0.2 to 2.0 wt %. The non-ionic surfactant should have a hydrophilic lipophilic balance (HLB) value of about 2 to 10. The surfactant functions to reduce the surface tension which enables penetration of the formulation into the snow/ice matrix and promotes wetting of the road surface under the snow/ice layer. Any surfactant which can accomplish the above objectives may be used. Suitable surfactants include:

The non-ionic surfactants typically comprise ethylene oxide condensates and include polyoxyethylene alcohols, phenols, acids and esters. Many products are available under the following designations:

Trade Names	Source
Plurafac, Pluronic, Chemal	B.A.S.F.
Ethonic	Ethyl Corp.
Igepal	GAF Corp.
Merpol	DuPont
Chemax, Ethofat	Akzo
Macol	PPG/Mazer

Anionic surfactants are usually sodium salts of various organic sulfonates and sulfates such as Na salts of alkyl aryl sulfonates, alkyl naphthalene sulfonate,

di-octyl sulfosuccinate, lauryl sulfate, saturated hydrocarbon sulfonate, dodecyl sulfonate, etc.

Many products are available under the following designations:

Trade Names	Source
Alkanol, Perrowet, Duponol	DuPont
Nekal, Igepon	GAF Chemicals
Karawet	Colloids Inc.
Stepanol	Stepan Co.
Astrowet	Alco Chem. Co.

The eutectic freezing point for a water solution containing three typical salts which can be used as the freezing point depressant are as listed in Table 2 below.

Table 2		
Salt	% Concentration	Freezing Point Temperature °F
NaCl	23	- 6
$MgCl_2$	21.6	- 27
$CaCl_2$	29.5	- 60

As can be seen from the above, $CaCl_2$ will allow melting down to - 60°F but requires a high concentration to achieve this temperature. $MgCl_2$ will allow melting down to - 27°F with a lower concentration of 21.6%. Therefore, the selection of a particular salt will depend to a large extent upon the contemplated winter temperature range of use for a given geographical region.

Table 3 below dramatically illustrates the wide variance in freezing points for the concentration range of $MgCl_2$ from 0 to 30%. As can be seen from the table, concentrations over 22% do not result in a lowering of the freezing point. Other salts e.g., $CaCl_2$, act in the same way.

Table 3		
% by Weight of $MgCl_2$	Specific Gravity	Freezing Point °F
0	1.000	+32
5	1.013	+26.4
10	1.086	+17.9
15	1.132	+4.0
20	1.180	-17.2
21	1.190	-23.0
22	1.200	-27.0
23	1.210	-20.0
24	1.220	-14
25	1.230	-10
26	1.241	-6
27	1.251	-3
28	1.262	-1
30	1.283	+3

The following examples (Table 4) represent specific embodiments of the present invention illustrating ten different colloid thickeners with freezing points varying from about 6.4 to -17.1°F (-16.4 to -27.3°C). Note that for the same concentrations of $MgCl_2$ the formulations of examples 1-10 exhibit a lower freezing point than an aqueous solution of $MgCl_2$ alone (Example 11).

TABLE 4

Ex. #	Colloid Thickener	Trade Name	Concen. of Thickener % by Weight *	Mg Chloride % by Wght *	Viscosity Ford Cup No. 4 (Sec.)	Freezing Point °C	°F
1.	Carboxy Methyl Cellulose	Methocel A	1.0	15.0	17	-16.4	+2.5
2	Hydroy Ethyl Cellulose	Natrosol 250 HHR	0.33	15.0	18	-17.1	+1.2
3	Hydroxy Propyl Methyl Cellulose	Methocel K 15 M	0.40	12.45	16	-21.5	-6.7
4	Dextrin	-	5.04	15.0	12	-20.4	-4.7
5	Maltodextrin	Maltodextrin No. 5	5.04	15.0	13	-20.4	-4.7
6	Gum Arabic	-	3.60	15.0	11	-18.8	-1.8
7	Alginic Acid	Airvol 325	2.7	15.0	17	-14.2	+6.4
8	Molasses	-	18.8	14.9	13	-24.9	-12.8
9	Maltodextrin	Maltodextrin No. 15	9.1	15.0	11	-27.3	-17.1
10	Gum Tragacanth	Tragacanth 470	0.2	15.0	14	-19.6	-3.3
11	None Aqueous Magnesium Chloride Reference Solution	-	None	15.0	-	-15.9	+3.4

*Balance = Water

Certain chlorides such as NaCl cause an undesirable spalling of concrete where repeated freezing/thawing occurs. Another harmful effect of salts is the corrosion of steel reinforcing rods imbedded in the concrete which results in severe shear cracking eventually resulting in localized failure in road surfaces, bridge decks, parking lot and garage surfaces.

Other additives may optionally be used with the formulation of the present invention. These additives include without limitation, corrosion inhibitors; coloring agents which aid road crews in determining where they have sprayed and antifoaming compounds should foaming be a problem.

After selecting the desired film forming material for a given application, there are two additional variables to consider. One is the temperature range of use under consideration, and the second is the type of freezing depressant used. Formulations of the present invention may be tailored for specific temperature ranges such as:

20°F to 32°F

10°F to 20°F

0°F to 10°F

- 10°F to 0°F

Some applications dictate the use of NaCl, some $CaCl_2$, and some $MgCl_2$ and in some cases calcium magnesium acetate. For example, corrosion can be controlled by reducing or eliminating the chloride ion concentration, and replacing it with a non chloride depressant such as calcium magnesium acetate.

The present invention provides for deicing formulations which effectively melt snow and ice and which reduce corrosion and provide consistent performance specifications from batch to batch.

While the present invention has been particularly shown and described with reference to the preferred mode as illustrated in the drawing, it will be understood by one skilled in the art that various changes in detail may be effected therein without departing from the spirit and scope of the invention as defined by the claims.

CLAIMS:

1. A de-icing composition which comprises an aqueous solution which contains a film forming agent and a freezing point depressant.

2. The composition of claim 1. is in which film forming agent comprises a material selected from the group consisting of colloids, emulsions and mixtures thereof.

3. The composition of claim 2 in which the freezing point depressant comprises a salt.

4. The composition of claim 2 in which the freezing point depressant comprises a material selected from a group consisting of chlorides and acetates.

5. The composition of claim 2 in which the freezing point depressant comprises a material selected from the group consisting of urea, urea derivatives, , glycerols, glycols, sugars, citric acid, lactic acid, primary alcohols, secondary alcohols, tertiary alcohols, glycolethers and mixtures thereof.

6. A de-icing composition comprising an aqueous solution which contain a film forming agent in the form of a colloid or emulsion or mixtures thereof, and a freezing point depressant in the form of a salt in which the constituents are present in the following concentration:

	Weight %
Thickener/Colloid/Emulsion	0.15 to 30
Salt	5 to 30
Water	40 to 90

7. A de-icing composition which comprises an aqueous solution which contains a film forming agent and a freezing point depressant in which the film forming agent comprises a material selected from the group consisting of colloids, emulsions and mixtures thereof, and where the freezing point depressant comprises a salt.

8. The composition of claim 7 in which the freezing point depressant comprises a material selected from a group consisting of chlorides and acetates.

9. The composition of claim 7 in which the freezing point depressant comprises a material selected from the group consisting of urea, urea derivatives, glycerols, glycols, sugars, citric acid, lactic acid, primary alcohols, secondary alcohols, tertiary alcohols, glycolethers and mixtures thereof.

10. A de-icing composition comprising an aqueous solution which contain a film forming agent in the form of a colloid or emulsion or mixtures thereof, and a freezing point depressant selected from the group consisting of chlorides and acetates in which the constituents are present in the following concentration:

	Weight %
Thickener/Colloid/Emulsion	0.15 to 30
Freezing Point Depressant	5 to 30
Water	Balance

11. The composition of claim 10 in which the film forming agent is at least one material selected from the group consisting of:

- cellulose derivatives;
- polyvinyl alcohol and copolymers;
- polyvinyl acetate and polymer emulsions;
- styrene- butadiene emulsions;
- urea/formaldehyde and melamine/formaldehyde condensates;
- polyacrylates and copolymer emulsions;
- modified polysaccharides (ethylene oxide or proylene oxide);
- xanthan gums;

- polyesters e.g. water soluble alkyds;
- maleic anhydride modified resins and oils;
- starches, starch ethers, dextrins;
- alginates;
- natural gums e.g. gum acacia, seaweed extracts; and
- caseins, zeins and derivatives.

12. A de-icing composition which comprises an aqueous solution which contains a film forming agent and a freezing point depressant in which the film forming agent comprises a material selected from the group consisting of colloids, emulsions and mixtures thereof, and where the freezing point depressant comprises a salt, said composition having a viscosity in the range of about 0.1 to 3 poises at 25°C.

13. The composition of claim 12 which further includes a non-ionic and/or anionic surfactant in a concentration of about 0.2 to 2.0 wt. %.

14. The composition of claim 12 in which the freezing point depressant comprises a material selected from the group consisting of urea, urea derivatives, glycerols, glycols, sugars, citric acid, lactic acid, primary alcohols, secondary alcohols, tertiary alcohols, glycolethers and mixtures thereof.

~~15. A de-icing composition comprising an aqueous solution which contain a film forming agent in the form of a colloid or emulsion or mixtures thereof, a surfactant and a freezing point depressant selected from the group consisting of chlorides and acetates in which the constituents are present in the following concentration:~~

	Weight %
~~Thickener/Colloid/Emulsion~~	~~0.15 to 30~~
~~Freezing Point Depressant~~	~~5 to 30~~
~~Surfactant~~	~~0.2 to 2~~
~~Water~~	~~Balance~~

16. A de-icing composition comprising an aqueous solution which contain a film forming agent in the form of a colloid or emulsion or mixtures thereof, and a freezing point depressant selected from the group consisting of chlorides and acetates in which the concentration of the constituents and properties are as follows:

Component	Weight %
Thickener/Colloid/Emulsion	0.15 to 30
Freezing Point Depressant	5 to 30
Water	Balance

Property	
Viscosity	0.1 to 3 poises (at 25°C)
pH	5 - 9

17. A method for inhibiting the accumulation of freezing precipitation on a surface which comprises applying an aqueous solution which contains a film forming agent and a freezing point depressant to said surface, wherein said solution has a viscosity of about 0.1 to 3 poises at 25°C.

18. The method of claim 17 in which the film forming agent contains a colloid or an emulsion and mixtures thereof.

19. The method of claim 18 in which the freezing point depressant includes a salt.

20. The method of claim 17 in which the surface comprises a roadway, bridge, parking garage or parking lot.

21. A method for inhibiting the accumulation of freezing precipitation on a surface which comprises applying to said surface an aqueous solution which

contains a film forming agent selected from the group consisting of a colloid or an emulsion and mixtures thereof, a surfactant and a freezing point depressant.

22. The method of claim 21 in which the freezing point depressant comprises a salt.

23. The method of claim 21 in which the surface comprises a roadway, bridge, parking garage or parking lot.

Abstract:

A de-icing composition in the form of an aqueous solution which contains a film forming agent and a freezing point depressant. The film forming agent comprises a material selected from the group consisting of colloids, emulsions and mixtures thereof, and the freezing point depressant includes a suitable inorganic or organic material.

CONFIDENTIAL

Bodycote ORTECH

memo:

Date: April 26, 1999

To: Dave Wood
Howard Sears
Sears Oil Co. Inc.

cc: Bob Hartley

From: John McNeill

Re: Progress Report on Formulation/Characterization Work

Dave, Howard and Bob:

Here is a short update on our progress to date on attempting to identify the components of the existing product responsible for freeze point depression, the development of formulation prototypes, and the analytical characterization of the cane product and Jordan salt solution:

- The ultrafiltration separation of the Anheiser Busch material is completed and appears to have been successful. Most of the freezing point depression tests have been carried out on the resulting fractions, and it is interesting to note that the low molecular weight fraction showed significant freeze point depression (about -27°C), whereas the high molecular weight fraction had a marginal effect, similar to that of a mixture of magnesium chloride and water (-20.3°C). We will attempt to confirm the molecular size of the high and low molecular weight fractions within the next several days. This may be further evidence that low molecular weight carbohydrate material is responsible for the freeze point depression, although there are other low molecular weight materials, e.g. minerals present, that could contribute to f.p.d. as well.

  One point to keep in mind in attempting to reformulate, is that if the low molecular weight fraction is indeed responsible for freeze point depression, it is possible that the anti-corrosive properties of the mixture are due to high molecular weight materials, and that a multi-component formulation might be necessary to fully mimic the existing product.

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ATTORNEYS' EYES ONLY

- Two bottles of cane product were received last week indicating a Columbian origin (Vinaza). The paperwork is attached. The analytical characterization of the cane product and the Jordan salt solution is underway, and the steel coupons for the corrosion tests have been ordered.

- In setting up the metals analyses, one of the analysts pointed out that certain states have specifications for trace metal content of brine solutions used for deicing; one provided as an example from the north-west US stipulates maximum tolerable levels for eleven compounds. Once we determine the basic composition of the Jordan sample, it may be useful to identify environmental limits and see if the product will comply. This will likely require higher sensitivity analysis by ICP-mass spectroscopy, which is available at our sister company in Montreal.

- The information supplied by Sears Oil regarding skid tests has been reviewed, and a method and device identified that could potentially be used to study slipperiness. We actually located the same device in our textiles department in what appears to be good working order, so this may save time in possibly developing a bench-scale test. The method will be discussed further and we will put forward our ideas and approach to addressing the slipperiness issue.

- The evaluation of stability of retained samples is on hold, since the value of pursuing this is questionable. However, the experiments that would measure viscosity versus temperature on the cane product, from –20°F to 40°F at 5°F intervals can begin. Please confirm if this study would be useful and we will proceed with the experiment.

- Finally, approximately 15 commercially available carbohydrate products have been ordered for evaluation as prototype formulations. These include various maltodextrins and corn syrup and corn syrup solids, caramel solutions, lactose and three grades of molasses. These are expected to arrive within the next five to ten days.

As the analytical data becomes available in the coming days and weeks, we will report the findings by fax. If you have any questions in the interim please don't hesitate to give me a call.

Sincerely,

John

Bodycote MATERIALS TESTING ORTECH LABORATORY

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Evaluation of Freezing Point Depression Ability of Prototype Raw Materials

A Report To:	Sears Oil Co. Inc. 1914 Black River Blvd., Rome, New York 13440. USA
Attention:	Mr. David Wood Vice-President Health Sciences
Report No.	99-B21E-0050 (Interim No. 7) 3 Pages, 2 Appendices
Date:	June 28, 1999

Respond to P8231FI

INTRODUCTION

This report details the preparation and assessment of prototype raw materials for potential replacement of the liquor portion of the existing anti-icing/deicing formulation. Chemical suppliers were contacted, our requirements explained to technical support individuals. A total of nineteen raw materials were acquired for the evaluation. A list of the candidate raw materials is presented in Table I, Appendix A, accompanied by the corresponding technical information supplied by each company.

METHODOLOGY

Where practical, an attempt was made to prepare solutions of each prototype material at a dissolved solids concentration of approximately 25%, since this was roughly the level of solute present in the low molecular weight fraction produced by ultrafiltration. A 25% concentration also resulted in more accurate readings, since the first several samples tested as received showed freezing points well below -40°C. The freezing points of the resulting diluted solutions were determined according to ASTM Method D 1177-94, Standard Test Method for Freezing Point of Engine Coolants. Each sample was analyzed using a volume of approximately 70 to 80 mL.

RESULTS

The freezing point depression (FPD) data appear in Table I, Appendix B. The first three carbohydrate-based materials examined (molasses, caramel color and high fructose corn syrup) produced freezing points below -40°C when mixed as received 1:1 with 30% magnesium chloride. The same materials tested at 25% w/w dilutions in water, had freezing points of –23.2, -23.0 and –22.7°C respectively.

Based on the ultrafiltration work which had indicated that the low molecular weight fraction contained 25% soluble solids, the remaining carbohydrate-based raw materials were tested at the 25% level.

The corn syrup solids containing the highest amount of low molecular weight sugars (DE =44) produced the greatest FPD, and it appeared that molasses, caramel color, all of the corn syrups/corn syrup solids produced depressions in the same range. Urea also worked well, and its use has been reported as a road de-icing chemical. However, all of the mixtures had freezing points below that obtained with the low molecular weight (LMW) fraction obtained from ultrafiltration (-26.9°C). The milk proteins, lactose, and carboxymethyl cellulose had little if any impact on freezing point. They displayed essentially the same impact on freezing point as the control mixture of 30% magnesium chloride and water (FPD of –20.4°C).

The corn syrup solids and high fructose corn syrup were then tested at a higher concentrations to determine if values closer to that of the current product could be achieved, i.e., in the range of -35°C. At a 50% level the high fructose corn syrup showed a freezing point value of –27.9°C, only slightly greater than the low molecular weight fraction from ultrafiltration. This is a significant finding, since the LMW fraction from ultrafiltration contained only 25% soluble solids. Even if all of the soluble solids in the LMW fraction were carbohydrate, this points toward the presence of other components which contribute to FPD. In fact it was not until the concentration of fructose was increased to 75% that a comparable decrease in FPD was achieved (–35.7°C).

In order to determine if there was a synergistic effect between protein and carbohydrate on FPD, it was decided to prepare a solution containing both. A 50% solution of high fructose corn syrup was made with 25% urea, and resulted in a FPD of –35.2°C. This represents more than a 7°C difference from that observed for 50% HFCS alone, and more than 11°C than obtained for 25% urea.

This may indicate that both carbohydrate and protein materials contribute to lowering of freezing point. It is unclear at this point whether this difference is due to a chemical interaction, for example, between the functional groups of urea and magnesium ion, or is simply due to an increased number of solute molecules in solution.

– In light of this result it may be useful to determine the nitrogen content of the LMW fraction from ultrafiltration, and attempt to better understand the nitrogenous components of this fraction.

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APPENDIX A

CANDIDATE MATERIALS FOR FREEZE POINT DEPRESSION EVALUATION WITH MAGNESIUM CHLORIDE

(40 Pages)

Table 1. Candidate Materials for Freeze Point Depression Evaluation with Magnesium Chloride

No.	Compound	Manufacturer	Trade Name	Description
1	Lactose	Land O'Lakes Food Ingredients Division	Lactose Grind 30	Lactose 99.5%
2	Molasses	Malt Products Corporation	645	Syrup extract from raw sugar, "Medium"
3	Molasses	Malt Products Corporation	732	Syrup extract from raw sugar "Light/Sweet", higher grade
4	Molasses	Malt Products Corporation	677	Syrup extract from raw sugar "Black Strap"
5	Caramel Color	Sethness Products Company	CS1	Caramelized Sugar Syrup, ~70% residual carbohydrates
6	Caramel Color	Sethness Products Company	YT25	Caramel Color, ~ 20% residual carbohydrates
7	Corn Syrup	Cargill Foods	Clearsweet 43/43 IX	Regular DE acid converted corn syrup, 19% glucose, 14% maltose, 12% maltotriose, 55% higher saccharides
8	High Fructose Corn Syrup	Cargill Foods	Isoclear 42HFCS	Enzymatically converted glucose syrup, 42% fructose, 52% glucose
9	High Maltose Corn Syrup	Cargill Foods	ClearSweet 43 MMIX	Acid-enzyme type corn syrup, maltose is the major carbohydrate constituent at 44%, 12% glucose, 20% maltotriose, 25% higher cho's
10	Corn Syrup Solids	A.E. Staley Manufacturing Company	Star-Dri 200	Complex carbohydrates with higher DE than maltodextrins, meaning more reducing substances, more low molecular weight carbohydrates relative to higher molecular weight compounds; DE = 20
11	Corn Syrup Solids	A.E. Staley Manufacturing Company	Star-Dri 240	DE = 24
12	Corn Syrup Solids	A.E. Staley Manufacturing Company	Star-Dri 42R	DE = 44
13	Carboxymethyl Cellulose	Dow Chemical Company	Methocel	Water soluble cellulosic polymer
14	Microcrystalline Cellulose	FMC Corporation	Avicel	Water insoluble dispersible colloidal material
15	Xanthan Gum	Daminco	Xanthan	Microbially produced complex carbohydrate, a cellulose chain with oligosaccharide groups attached
16	Milk Protein Isolate	New Zealand Dairy Products	TMP 1230	Casein and whey proteins isolated from fresh milk, highly soluble, used as an emulsifier and water binder, high viscosity water solutions
17	Sodium Caseinate	New Zealand Dairy Products	Alanate 180	Spray dried milk protein, 92% protein

APPENDIX B

FREEZE POINT DEPRESSION TEST RESULTS FOR PROTOTYPE COMPOUNDS MIXED WITH MAGNESIUM CHLORIDE

(1 Page)

MALT

Bodycote Ortech Inc.

Freezing Point Depression Ability of Prototype Materials
For Sears Oil Co. Inc.

Appendix
Report No.: 99-B21E-0050 (Interim No. 7)

TABLE I. Freezing Point Depression Test Results for Prototype Compounds

Raw Material	Dilution in Water (%w/w)	Freezing Point (°C) (Compound Diluted in Water) Mixed 1:1 v/v with 30%$MgCl_2$
Molasses (light / sweet)	25	-23.2
Caramel Color CS1 (70%)	25	-23.0
Caramel Color (20%)	25	-24.1
Corn Syrup	25	-23.5
High Fructose Corn Syrup	25	-22.7
High Fructose Corn Syrup	50	-27.9
High Fructose Corn Syrup	75	-35.7
High Maltose Corn Syrup	25	-22.4
Corn Syrup Solids DE=20	25	-23.3
Corn Syrup Solids DE=24	25	-23.3
Corn Syrup Solids DE=44	25	-24.2
Corn Syrup Solids DE=44	50	-29.6
Carboxymethyl Cellulose	0.1	-19.2
Milk Protein Isolate	0.2	-20.0
Lactose	25	-24.3
Sodium Caseinate	6.2	-20.6
Urea	25	-23.7
50% HFCS / 25% Urea		-35.2
Anheiser Busch After Centrifugation and Filtration		-34.6
30% $MgCl_2$ (control)		-20.4

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COMMERCIAL INVOICE

DATE OF EXPORTATION

EXPORT REFERENCES

SHIPPER / EXPORTER

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CONSIGNEE
BODY ORTECH
2395 SPEAKMAN DR
MISSISSAUGA, ON CANADA L5K1B3

COUNTRY OF EXPORT
USA

IMPORTER-if other than consignee

COUNTRY OF ORIGIN OF GOODS
USA

COUNTRY OF ULTIMATE DESTINATION

INTERNATIONAL AIR WAYBILL NO. 400-07634185

NO. OF PKGS	FULL DESCRIPTION OF GOODS	QTY	UNIT OF MEASURE	UNIT VALUE	TOTAL VALUE
1	MOLASSES SAMPLES	3	pint	0.30	0.90
	NOT FOR SALE				
TOTAL NO. OF PKGS					TOTAL INVOICE VALUE
1					0.90

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SP 00914

Signature of the shipper/exporter

Date
5/3/99

SETHNESS CARAMEL COLOR

SETHNESS CS1 CARAMELIZED SUGAR SYRUP

TYPICAL ANALYSIS

Tinctorial Power, $K_{0.56}$*	0.000145
Baume' @ 60° F	39.5
pH "as is"	3.3
Reducing Sugars,%	65

* 0.1% solution absorbance/cm @ 560 nm

Ingredient List - Sucrose
Water

These data represent typical information and are not intended to be used for establishing specifications.

The above color additive meets all of the standards and specifications for Caramel as described and defined under Title 21 of the Code of Federal Regulations, Chapter I, Subchapter A, Section 73.85.

HHN-3 SPC

SETHNESS PRODUCTS COMPANY
1347 Beaver Channel Parkway, Clinton, Iowa 52732-5933 (319) 243-3943 Fax (319) 243-1663

SETHNESS CARAMEL COLOR

SETHNESS YT25 CARAMEL COLOR

TYPICAL ANALYSIS

Tinctorial Power, $K_{0.56}$*	0.025
Hue Index, s	7.4
Baume' @ 60° F	39.8
Specific Gravity @ 60° F	1.3783
pH "as is"	4.2
Iron, ppm	20
Storage Life, years	2

* 0.1% solution absorbance/cm @ 560 nm

These data represent typical information and are not intended to be used for establishing specifications.

The above color additive meets all the standards and specifications for Caramel as described and defined under Title 21 of the Code of Federal Regulations, Chapter I, Subchapter A, Section 73.85.

AJ-39 SPC

SP 00916

SETHNESS PRODUCTS COMPANY
1347 Beaver Channel Parkway, Clinton, Iowa 52732-5933 (319) 243-3943 Fax (319) 243-1663

ORIGINAL

INVOICE

UR **SETHNESS** **CARAMEL COLOR**

SETHNESS PRODUCTS COMPANY
3422 W. TOUHY AVENUE CHICAGO, ILLINOIS 60645-2717
1347 BEAVER CHANNEL PKY - CLINTON IA 52732-5933

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APRIL 23, 1999

CUSTOMER	LOC.	SALESMAN	FOB	TERMS	CUSTOMER P.O. NO	DATE SHIPPED	OUR ORDER NO.

ROUTING	CAR NO.	CAR INITIALS	BILL OF LADING NO.

SHIPPED	PROD. NO.	DESCRIPTION	GALLONS	POUNDS	PRICE	U/M	AMOUNT
1 PKG		ARTIFICIAL COLORING SAMPLE		2#	$1		

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"NON-FLAMMABLE"
"NON-CORROSIVE"
"NOT RESTRICTED TO AIR TRAVEL"

SIGNED: Sue Reedy

SP 00917

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St. Lawrence Starch, Division of Cargill Ltd.

FAX transmission

From.	Belinda Elysée-Collen	Date:	04/23/99
To.	John McNeil	Time:	1:36 PM
Company		FAX #:	823-1446

Message

Dear John,

Please see attached product information sheets for Clearsweet 43/431X, Clearsweet 43HMIX, and Isoclear 42HFCS. I have also attached some information on the other types of sweeteners that are available for your reference

If you have any specific questions on the products, I would be pleased to discuss with you The samples will be ready for pick up at our office on Tuesday after lunch.

Regards

Belinda Elysée-Collen

Belinda Elysée-Collen
Technical Services Manager

This transmission consists of 6 pages including this one.

VOICE: (905) 274-3671 ext. 276 FAX: (905) 271-1258

141 Lakeshore Rd. E., Mississauga, Ontario, L5G 1E8

CARGILL FOODS

Technical Information

Corn Syrup

Corn Milling

PHYSICAL PROPERTY SUMMARY

	DE	Be°@ 100°F	RI @ 45 C	% TS	Sp. G 100/ 60° F	#/Gal. 100 F	DP_1	DP_2	DP_3	H.S.
Cleardex® 25AE/42	25	42.2	1.4906	78.2	1.4091	11.75	5	6	11	78
Cleardex® 28AE/42	28	42.2	1.4903	78.4	1.4091	11.75	8	8	11	73
Cleardex® 36/43	36	43	1.4940	80.4	1.4199	11.84	14	11	10	65
Clearsweet® 43/43	43	43	1.4935	80.7	1.4197	11.84	19	14	12	55
Clearsweet® 43/44	43	44	1.4992	82.7	1.4338	11.95	19	14	12	55
Clearsweet® 43/44.5	43	44.5	1.5020	83.7	1.4407	12.01	19	14	12	55
Clearsweet® 43% H.M.	--	43	1.4937	80.9	1.4199	11.84	9	43	18	30
Clearsweet® 52/43	52	43	1.4930	81.2	1.4199	11.84	28	18	13	41
Clearsweet® 52AE/43	52	43	1.4930	81.3	1.4199	11.84	28	23	12	37
Clearsweet® 53/44	53	44	1.4987	83.3	1.4337	11.95	24	31	20	25
Clearsweet® 60/44 IX	60	44	1.4990	84.0	1.4335	11.95	31	36	10	23
Clearsweet® 63/43	63	43	1.4930	82.0	1.4198	11.84	36	31	13	20
Clearsweet® 63/44	63	44	1.4985	84.0	1.4337	11.95	36	31	13	20
Clearsweet® 66/43	66	43	1.4932	82.3	1.4197	11.84	40	35	8	17
Clearsweet® 95/37	97	--	1.4595	71.0	1.3348	11.13	95	3	.5	1.5
Satin Sweet® 65%	--	42.8	1.4929	81.0	1.4174	11.82	4	65	15	16

The sulfur dioxide content of the above corn syrups is below 40 ppm. Low Sulfur dioxide (<10 ppm) corn syrup is available in certain corn syrups upon request. The pH is 4.9 in a 1:1 mixture with distilled wate.

CA-304

NORTH AMERICAN CORN MILLING DIVISION SWEETENER SALES LOCATIONS

Box 1467
Cedar Rapids, IA 52406
319-399-2111
319-399-2103 (fax)

Box 1400A
Dayton, OH 45413
937-237-1272
937-237-1238 (fax)

Box 13368
Memphis, TN 38113
901-775-5805
901-775-5872 (fax)

Port of Stockton Rd 13
Stockton, CA 95201
209-942-4171
209-942-2671 (fax)

CARGILL FOODS

Corn Milling

Product Information

Corn Sweeteners

PRODUCT NAME	FEATURES	BENEFITS	APPLICATIONS
Satin Sweet® Liquid Maltose (55% - 75%)	Ion-exchanged, high maltose	Near absence of sodium and sulfites, slightly sweeter than conventional corn syrup	Frozen dairy desserts, confections, table syrups, catalytic reduction
Satin Sweet® 65% Maltose, Dry	Ion-exchanged, high maltose corn syrup solids	Near absence of sodium and sulfites, slightly sweeter than conventional corn syrup	Carrier for flavors, spices, and colors
Clearflo™ Corn Syrup Solids	Low and intermediate DE, acid and acid-enzyme converted corn syrup solids	Clean, bland flavor, good bulking characteristics, low moisture level	Coffee whitener, dry mixes, processed meats
Clearsweet® 60/44 Corn Syrup	High D.E., ion-exchanged and carbon refined dual conversion corn syrup	Low ash, low sodium, less protein, high sweetness and low viscosity	Baking, beverages
Clearsweet® Unrefined 95% Dextrose Corn Syrup	Primarily dextrose with small amounts of short chain polysaccharides	High degree of fermentability	Fermentation feedstock
Clearsweet® Dextrose Anhydrous	Unique particle shape and porosity, low moisture content	Better handling and flowability, good carrying agent, improved solubility	Baking, beverage powder, confections, dry blends
Clearsweet® 95% Dextrose Corn Syrup	Primarily dextrose with small amounts of short chain polysaccharides	Highly refined fermentable carbohydrate source, low salts, low sulfites	Pharmaceuticals, brewing, fermentation
Clearsweet® 99% Refined Liquid Dextrose	Principally dextrose, ion exchanged	Highly refined carbohydrate source with very high degree of fermentability	Brewing, fermentation, catalytic reduction

TECHNICAL SERVICES
For technical assistance, please contact Cargill at 800-801-0615.

NORTH AMERICAN CORN MILLING DIVISION SWEETENER SALES LOCATIONS

Box 1467 Cedar Rapids, IA 52406 Tel: 319-399-2111	Box 1400A Dayton, OH 45413 Tel: 937-236-1971	Box 13368 Memphis, TN 38113 Tel: 901-775-6800	Port of Stockton Rd 13 Stockton, CA 95201 209-942-4171

Cargill de Mexico, S.A. de C.V.
Bosques De Ciruelos No. 168 3d Floor
Col. Bosques De Las Lomas
C.P. 11700
D.F. Mexico
Tel: (525) 6-29-27-00
Fax: (525) 6-29-27-75

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CA-127b REV 6/97

CARGILL FOODS

Corn Milling

Product Information

Corn Sweeteners

PRODUCT NAME	FEATURES	BENEFITS	APPLICATIONS
Cleardex® Corn Syrups (25/42 - 36/43)	Low D.E., acid and acid-enzyme converted corn syrup	Bland, minimal sweetness, low hygroscopicity, good bulking characteristics to build body and mouthfeel	Coffee whiteners, frozen desserts
Clearsweet® Corn Syrups (43/43 - 63/43)	Intermediate and high D.E. acid and acid-enzyme converted corn syrup	Higher sweetness level, less body and better humectancy	Jams, jellies, confections, baking, beverages, chewing gum, table syrups
Clearbrew® Liquid Adjuncts (53/44 - 63/44)	Acid enzyme converted	High concentration of fermentable sugars	Brewing adjuncts
Isoclear® High Fructose Corn Syrups 42HFCS and 55HFCS	Multiple enzyme and high fructose corn syrup	Clean, nonmasking taste, clear color, high sweetness level, designed for replacement of sugar and invert sugar	Beverages, condiments, baking, sweetened juice drinks, flavored dairy products

TECHNICAL SERVICES
For technical assistance, please contact Cargill at 800-801-0615.

NORTH AMERICAN CORN MILLING DIVISION SWEETENER SALES LOCATIONS

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C.P. 11700
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Tel: (525) 6-29-27-00
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SP 00921

CA-127a REV 6/98

CARGILL FOODS

Corn Milling

[illegible]

Corn Syrup

PROPERTIES AND FUNCTIONAL USES OF CORN SYRUPS

Nutritive corn sweeteners are used extensively in many food systems. Their unique properties encompass a wide variety of functional uses. Listed below are some of the functions that are affected by corn sweeteners.

To use this chart determine the degree of conversion of the corn syrup being considered. Dextrose equivalent is a commonly used measure of conversion in corn syrups.

The degree of conversion may increase or decrease the specific property being considered. These uses should be viewed as a trend and not as an absolute when considering the selection of a corn sweetener to affect any function.

Property or Functional Use (Alphabetically)	Dextrose Equivalent Low (25DE) — High (66DE)
Bodying Agent	←
Browning Agent	→
Cohesiveness	←
Fermentability	→
Flavor Enhancement	→
Flavor Transfer Medium	→
Foam Stabilizer	←
Freezing Point Depression	→
Humectancy	↔
Hygroscopicity	→
Nutritive Solids	↔
Osmotic Pressure	→
Prevention of Sugar Crystals	←
Ice Crystal Prevention in Freezing	←
Sheen Producer	↔
Sweetness	→
Viscosity	←

The sulfur dioxide content of the above corn syrups is below 40 ppm. Low Sulfur dioxide (<10 ppm) corn syrup is available in certain grades upon request. The pH is 4.9 in a 1:1 mixture with distilled water.

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NORTH AMERICAN CORN MILLING DIVISION SWEETENER SALES LOCATIONS

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319-399-2103 (fax)

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937-237-1272
937-237-1238 (fax)

Box 13368
Memphis, TN 38113
901-775-6800
901-775-6872 (fax)

Port of Stockton Rd 13
Stockton, CA 95201
209-942-4171
209-9

CARGILL FOODS

Corn Milling

Product Information

IsoClear® 42
High Fructose Corn Syrup

IsoClear®42 is a high fructose corn syrup produced by Cargill, Incorporated using a multiple enzyme process. Its high quality, clean, non-masking taste and clear, water-white color make Isoclear®42 ideal for use in the food and beverage industry. This easy-handling, stable syrup with 94% (DSB) combined fructose and dextrose solids may be used to replace up to 100% of sucrose or invert syrup in many food and beverage applications.

REPRESENTATIVE CHEMICAL AND PHYSICAL DATA

Essential Properties	
Refractive Index (20°C)	1.4643
Total Solids (%)	71.0
Moisture (%)	29.0
Sulfated Ash (%)	0.05
pH (1:1)	4.0
Sulfur Dioxide (PPM)	2 Max.
Calories/100g	279

Characteristics	
Appearance	Clear Liquid
Taste	Sweet, Bland
Odor	Characteristic

Weight/Volume Factors	
Specific Gravity (100°/60°F)	1.3372
Pounds/Gallon (100°F)	11.15
Pounds/Gallon (DSB)	7.92

Viscosity	(Centipoise)
80°F	220
90°F	165
100°F	95
110°F	70
120°F	55

Chromatographic Analysis (% Dry Basis)	
Fructose	42
Dextrose	52
Maltose	3
Higher Saccharides	3

IsoClear® 42 HFCS meets all standards set by the National Soft Drink Association for color, taste, odor, floc, sediment and microbiological standards.

CA-181

NORTH AMERICAN CORN MILLING DIVISION SWEETENER SALES LOCATIONS

Box 1467
Cedar Rapids, IA 52406
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319-399-2103 (fax)

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Dayton, OH 45413
513-237-1272
513-237-1238 (fax)

Box 13368
Memphis, TN 38113
901-775-5805
901-775-5872 (fax)

Port of Stockton Rd 13
Stockton, CA 95201
209-942-4171
209-942-2671 (fax)

CARGILL FOODS

Corn Milling

Technical Information

Corn Sweeteners

NUTRITIONAL INFORMATION

The following typical analyses are representative of demineralized and non-demineralized corn syrups including dextrose and high fructose syrups.

	Non Ion Exchanged	Ion Exchanged
Calories/gra (DSB)	4	4
Protein (%)	0.05	0.01
Ash (%)	0.35	0.05
Sodium (PPM)	800	less than 50
Chloride (PPM)	1200	less than 75
Calcium (PPM)	less than 50	less than 3
Magnesium (PPM)	less than 50	less than 3
Iodine (PPM)	less than 1	less than 1
Copper (PPM)	less than 1	less than 1
SO_2 (PPM)	40	less than 1
Cholesterol (%)	0	0
Vitamins (%)	0	0
Fat (%)	0	0

CA-174

NORTH AMERICAN CORN MILLING DIVISION SWEETENER SALES LOCATIONS

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319-399-2103 (fax)	513-237-1238 (fax)	901-775-6872 (fax)	209-942-2571 (fax)

CARGILL FOODS

Corn Milling

Product Information

Clearsweet® 43% IX High Maltose Corn Syrup

Cargill's Clearsweet® 43% HM IX is a pure, specially prepared acid-enzyme type corn syrup which contains maltose as its major carbohydrate constituent. This high maltose syrup improves flavor, body, and texture at high sucrose replacement levels while imparting resistance to color formation, to moisture absorption and to crystallization in finished products such as hard candies. It produces finished products which have exceptional stability, clarity, and brilliance.

REPRESENTATIVE CHEMICAL AND PHYSICAL DATA

Essential Properties		Characteristics	
Baume, Comm (140°/60°+1)	42.7 - 43.3	Appearance	Clear Liquid
Refractive Index (45°C)	1.4922 - 1.4955	Taste	Sweet, Bland
Total Solids (%)	80.4 - 81.6	Odor	Characteristic
Moisture (%)	18.4 - 19.6		
Sulfated Ash (%)	0.05		
Sulfur Dioxide (ppm)	3 Max.		
Calories/100g	316		
Sodium (ppm)	200 Max.		

Weight/Volume Factors		Viscosity	(Centipoise)
Specific Gravity (100°/60°F)	1.4198		
Pounds/Gallon (100°F)	11.84		
Pounds/Gallon (DSB)	9.59	80°F	54,000
		90°F	22,000
		100°F	11,500
Chromatographic Analysis		110°F	6,500
(% Dry Basis)		120°F	4,200
Dextrose	12	130°F	2,500
Maltose	43	140°F	1,600
Maltotriose	20		
Higher Saccharides	25		

The above analyses are merely typical guides. They are not to be construed as being specifications. All of the above information is, to the best of our knowledge, true and accurate. However, since the conditions of use are beyond our control, all recommendations or suggestions are made without guarantee, express or implied, on our part. We disclaim all liability in connection with the use of the information contained herein or otherwise, and all such risks are assumed by the user. Nothing contained herein shall be construed to infer freedom from patent infringement. We further expressly disclaim all warranties of MERCHANTABILITY and FITNESS FOR A PARTICULAR PURPOSE.

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Stockton, CA 95201
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209-942-2671 (fax)

CARGILL FOODS

Corn Milling

Product Information

Satin Sweet® 55% Maltose Corn Syrup

Satin Sweet® 55% Maltose is a new high maltose corn syrup available for use in many industries such as dairy, brewing, confectionery and others where its properties are desirable. The near absence of sodium and sulfur dioxide also offers desirable characteristics for food applications.

REPRESENTATIVE CHEMICAL AND PHYSICAL DATA

Essential Properties	
Refractive Index (45° C)	1.4938
Total Solids (%)	81.0
Moisture (%)	19.0
Sulfated Ash (%)	0.03
pH (1:1)	4.0
Sulfur Dioxide (PPM)	2 Max.
Calories/100g	319

Characteristics	
Appearance	Clear Liquid
Taste	Sweet, Bland
Odor	Characteristic

Viscosity (Centipoise)	
80° F	25,500
90° F	12,000
100° F	7,000
110° F	4,500
120° F	2,500
130° F	1,000
140° F	500

Weight/Volume Factors	
Specific Gravity (100°/60° F)	1.4194
Pounds/Gallon (100° F)	11.83
Pounds/Gallon (DSB)	9.59

Chromatographic Analysis (% Dry Basis)	
Dextrose	8
Maltose	56
Maltotriose	16
Higher Saccharides	22

CA-314

NORTH AMERICAN CORN MILLING DIVISION SWEETENER SALES LOCATIONS

Box 1467	Box 1400A	Box 13368	Port of Stockton Rd 13
Cedar Rapids, IA 52406	Dayton, OH 45413	Memphis, TN 38113	Stockton, CA 95201
319-399-2111	937-237-1272	901-775-6800	209-942-4171
319-399-2103 (fax)	937-237-1238 (fax)	901-775-6872 (fax)	

SP 00923

CARGILL FOODS

Corn Milling

Product Information

Clearsweet® 43/43 IX Corn Syrup

Clearsweet® 43/43 IX is a pure, regular D.E. acid-converted syrup. The level of sweetness and balanced composition of saccharides makes Clearsweet® 43/43 IX the ideal sweetener for confections, jams, jellies, fountain and table syrups.

REPRESENTATIVE CHEMICAL AND PHYSICAL DATA

Essential Properties		Characteristics	
Dextrose Equivalent (DE)	41 - 45	Appearance	Clear Liquid
Baume, Comm (140°/60°+1)	42.7 - 43.3	Taste	Sweet, Bland
Refractive Index (45°C)	1.4922 - 1.4955	Odor	Characteristic
Total Solids (%)	80.2 - 81.4		
Moisture (%)	18.6 - 19.8		
Sulfated Ash (%)	0.03		
Sulfur Dioxide (ppm)	3 Max.		
Calories/100g	316		
Sodium (ppm)	200		

Weight/Volume Factors		Viscosity	(Centipoise)
Specific Gravity (100°/60°F)	1.4190	80°F	81,000
Pounds/Gallon (100°F)	11.84	90°F	40,000
Pounds/Gallon (DSB)	9.56	100°F	24,000
		110°F	11,000
		120°F	7,000
		140°F	2,500

Chromatographic Analysis (% Dry Basis)	
Dextrose	19
Maltose	14
Maltotriose	12
Higher Saccharides	55

CA-345R

NORTH AMERICAN CORN MILLING DIVISION SWEETENER SALES LOCATIONS

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319-399-2138	513-237-1272	901-775-5805	209-942-4171
319-399-2103 (fax)	513-237-1238 (fax)	901-775-5872 (fax)	209-942-2671 (fax)

CARGILL FOODS

Corn Milling

Product Information

Clearsweet® Unrefined 95% Dextrose Corn Syrup

Cargill, Incorporated produces an Unrefined 95% Dextrose Corn Syrup which is used as a fermentation feedstock.

REPRESENTATIVE CHEMICAL AND PHYSICAL DATA

Essential Properties			
Dextrose Equivalent (D.E.)	97	Calcium (ppm)	<300
Refractive Index (20°C)	1.4395	Iron (ppm)	<10
Total Solids (%)	71.0	Magnesium (ppm)	<100
Moisture (%)	29.0	Nitrogen (ppm)	<100
Sulfated Ash (%)	<0.4	Sodium (ppm)	<100
pH (1:1)	4.0		
Sulfur Dioxide (ppm)	<100	Total Fermentables	99.0

Weight/Volume Factors	
Specific Gravity (20°C)	1.2821
Pounds/Gallon (20°C)	10.67
Pounds/Gallon (DSB)	6.40

Chromatographic Analysis (% Dry Basis)	
Fructose	1.0
Dextrose	95.0
Maltose	2.5
Maltotriose	0.6
Higher Saccharides	1.0

[illegible] MERCHANTABILITY [illegible] FITNESS FOR A PARTICULAR PURPOSE

[illegible]

NORTH AMERICAN CORN MILLING DIVISION SWEETENER SALES LOCATIONS

Box 1447	Box 1400A	Box 11368	Port of Stockton Rd 13
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319-399-2111	937-237-1272	901-775-5605	209-[illegible]-4171
319 [illegible] 2103 (fax)	937-237-1238 (fax)	901-775-5672 (fax)	209-942 2671 (fax)

SP 00925

CARGILL FOODS

Corn Milling

Product Information

IsoClear® 55
High Fructose Corn Syrup

IsoClear® 55 is a high fructose corn syrup produced by Cargill, Incorporated that is designed for the replacement of sucrose and invert syrup. Its sweetness and clean, non-masking taste make IsoClear® 55 ideal for use in the beverage industry. This easy-handling, stable syrup with 96% (DSB) combined fructose and dextrose solids may be used in many food and beverage applications.

REPRESENTATIVE CHEMICAL AND PHYSICAL DATA

Essential Properties	
Refractive Index (20°C)	1.4786
Total Solids (%)	77.0
Moisture (%)	23.0
Sulfated Ash (%)	0.05
pH (1:1)	4.0
Sulfur Dioxide (PPM)	2 Max.
Calories/100g	303

Characteristics	
Appearance	Clear Liquid
Taste	Sweet, Bland
Odor	Characteristic

Weight/Volume Factors	
Specific Gravity (100°/60°F)	1.3746
Pounds/Gallon (100°F)	11.46
Pounds/Gallon (DSB)	8.82

Viscosity	(Centipoise)
80°F	760
90°F	520
100°F	360
110°F	240
120°F	160

Chromatographic Analysis (% Dry Basis)	
Fructose	55
Dextrose	41
Maltose	2
Higher Saccharides	2

IsoClear® 55 HFCS meets all standards set by the National Soft Drink Association for color, taste, odor, floc, sediment and microbiological standards.

The above analyses are merely typical guides. They are not to be construed as being specifications. All of the above information is, to the best of our knowledge, true and accurate. However, since the conditions of use are beyond our control, all recommendations or suggestions are made without guarantee, express or implied, on our part. We disclaim all liability in connection with the use of the information contained herein or otherwise, and all such risks are assumed by the user. Nothing contained herein shall be construed to infer freedom from patent infringement. We further expressly disclaim all warranties of MERCHANTABILITY and FITNESS FOR A PARTICULAR PURPOSE

CA-182

NORTH AMERICAN CORN MILLING DIVISION SWEETENER SALES LOCATIONS

Box 1467
Cedar Rapids, IA 52406
319-399-2138
319-399-2103 (fax)

Box 1400A
Dayton, OH 45413
513-237-1272
513-237-1238 (fax)

Box 13368
Memphis, TN 38113
901-776-6805
901-775-5872 (fax)

Port of Stockton Rd 13
Stockton, CA 95201
209-942-4171
209-942-2571 (fax)

CARGILL FOODS

Corn Milling

Product Information

IsoClear® 90
High Fructose Corn Syrup

IsoClear® 90 is a second generation high fructose corn syrup produced by Cargill, incorporated and designed for the replacement of sugar and invert syrup where lower calories or higher sweetness is required.

Applications include reduced calorie and dietetic foods, especially soft drink beverages, jams and jellies.

REPRESENTATIVE CHEMICAL AND PHYSICAL DATA

Essential Properties	
Refractive Index (20°C)	1.4784
Total Solids (%)	77.0
Moisture (%)	23.0
Sulfated Ash (%)	0.05
pH	4.0
Sulfur Dioxide (PPM)	2 Max.
Calories/100g	303
Weight/Volume Factors	
Specific Gravity (100°/60°F)	1.3764
Pounds/Gallon (100°F)	11.48
Pounds/Gallon (DSB)	8.84

Characteristics	
Appearance	Clear Liquid
Taste	Sweet, Bland
Odor	Characteristic

Viscosity	(Centipoise)
80°F	1,400
90°F	700
100°F	460
110°F	320
120°F	180

Chromatographic Analysis	
(% Dry Basis)	
Fructose	90
Dextrose	7
Maltose	1.5
Higher Saccharides	1.5

CA-184

NORTH AMERICAN CORN MILLING DIVISION SWEETENER SALES LOCATIONS

Box 1467	Box 1400A	Box 13368	Port of Stockton Rd 13
Cedar Rapids, IA 52406	Dayton, OH 45413	Memphis, TN 38113	Stockton, CA 95201
319-399-2138	513-237-1272	901-775-5805	209-942-4171
319-399-2103 (fax)	513-237-1238 (fax)	901-775-5872 (fax)	209-942-2671 (fax)

CARGILL FOODS

Corn Milling

Product Information

Clearsweet® 99 Refined Liquid Dextrose

Clearsweet® 99 Refined Liquid Dextrose contains principally dextrose. The high dextrose content in Clearsweet® 99 Refined Liquid Dextrose makes it especially useful as a carbohydrate source in fermentation for the food, pharmaceutical and brewing industries.

REPRESENTATIVE CHEMICAL AND PHYSICAL DATA

Essential Properties		Characteristics	
Fermentables (%)	99.5		
Refractive Index (20°C)	1.4640	Appearance	Clear Liquid (140°F) Solid at Room Temp.
Total Solids (%)	71.0		
Moisture (%)	29.0	Taste	Sweet, Bland
Sulfated Ash (%)	0.03	Odor	Characteristic
pH (10%)	4.5	Storage Temp.	125-135°F
Sulfur Dioxide (PPM)	2 Max.		
Calories/100g	280		

Weight/Volume Factors		Viscosity	(Centipoise)
Specific Gravity (100°/60°F)	1.3341	130°F	41
Pounds/Gallon (100°F)	11.12	140°F	34
Pounds/Gallon (DSB)	7.90	150°F	28

Chromatographic Analysis (% Dry Basis)	
Dextrose	99.0
Fructose	0.1
Maltose	0.6
Triose	0.2
Higher Saccharides	0.1

The above analyses are merely typical guides. They are not to be construed as being specifications. All of the above information is, to the best of our knowledge, true and accurate. However, since the conditions of use are beyond our control, all recommendations or suggestions are made without guarantee, express or implied, on our part. We disclaim all liability in connection with the use of the information contained herein or otherwise, and all such risks are assumed by the user. Nothing contained herein shall be construed to infer freedom from patent infringement. We further expressly disclaim all warranties of MERCHANTABILITY and FITNESS FOR A PARTICULAR PURPOSE.

CA-197

NORTH AMERICAN CORN MILLING DIVISION SWEETENER SALES LOCATIONS

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SP 00931

STAR-DRI®
MALTODEXTRINS & CORN SYRUP SOLIDS FROM STALEY

Rediscover Classic STAR-DRI® Maltodextrins

As people strive for healthier diets, food processors are challenged to maintain traditional qualities while changing formulations to meet new consumer demands. Classic STAR-DRI maltodextrins from Staley are traditional ingredients that make significant contributions to successful new foods containing less fat, fewer calories and increased complex carbohydrate levels.

STAR-DRI maltodextrins have commonly been used in a wide variety of foods for their contributions to texture, viscosity, moisture control, film formation and other functionalities. Today, STAR-DRI products are being used in new ways to economically control various quality features in reduced fat foods – foods generally higher in moisture than their full-fat counterparts.

STAR-DRI maltodextrins contain complex carbohydrates. As such they help consumers comply with current dietary guidelines that recommend increasing their intake. In addition, STAR-DRI maltodextrins provide a means of carbohydrate loading in specialized applications.

In both traditional and contemporary foods, STAR-DRI maltodextrins provide important functionalities that add to food quality.

Table 1

Description of STAR-DRI Maltodextrins

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
STAR-DRI [illegible]	[illegible]	[illegible]	Standard Powder	Bakery [illegible] Flavor Carrier, Binder
STAR-DRI [illegible]	[illegible]	[illegible]	Standard Powder	Flavor Carrier, Frostings, Dairy Desserts
STAR-DRI 100	10	[illegible]	Standard Powder	Flavor Carrier, Dairy Desserts, Sugar Fondants, Batters
STAR-DRI 1005A	10	[illegible]	Agglomerate	Nutritional Beverages, Dry Mixes, Dispersant, Bulking Agent
STAR-DRI 1015A	10	15	Agglomerate	Nutritional Beverages, Dry Mixes, Dispersant, Bulking Agent
STAR-DRI 150	15	35	Standard Powder	Confections, Beverage Mixes Dairy Desserts
STAR-DRI 180	18	36	Standard Powder	Flavor Carrier, Dairy Desserts
LIQUID 3260	18	N/A	Liquid 70% D.S.	Spray Drying Carrier

What Are STAR-DRI Maltodextrins?

STAR-DRI maltodextrins are a series of products produced from corn starches. They are classified by "dextrose equivalent" or DE, which is a measure of the reducing sugars present calculated as dextrose and expressed as a percentage of the total dry substance. Glucose or dextrose has a DE of 100.

STAR-DRI maltodextrins have DE values of less than 20. Table 1 lists STAR-DRI maltodextrins in ascending order based on DE and briefly identifies each product and its applications.

SP 00933

Although DE values are useful for identification and manufacturing control, the properties of STAR-DRI products are largely due to their carbohydrate or saccharide profiles. Saccharide distribution profiles for a series of STAR-DRI maltodextrins are given in Table 2.

Table 2

Typical Saccharide Analysis of STAR-DRI Maltodextrins

Analysis	STAR-DRI Products 1	5	100	150	180
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	5.7	7.6	10.2
Heptasaccharide, DP7		[illegible]	5.4	6.3	7.0
Octasaccharide, DP8		1.4	4.0	4.4	4.1
Nonasaccharide, DP9		1.4	3.2	3.5	3.1
Decasaccharide, DP10		1.3	2.7	3.0	2.5
Higher Saccharide, DP11+	99.4	87.8	64.0	54.0	44.6

Applications For STAR-DRI Products

STAR-DRI maltodextrins are used in a wide variety of reduced and full calorie foods — dry mixes of all kinds, confections, frostings, desserts, salad dressings, spreads, and sports drinks for example. Applications for specific STAR-DRI products are included in Table 1. Staley's applications research staff continues to explore new uses for STAR-DRI products in foods that appeal to today's consumers.

Functional Properties

Effect of DE on Functional Properties - STAR-DRI products have a number of features that make them valuable as dispersing aids, flavor carriers, bulking agents, humectants, viscosity stabilizers, and other functional ingredients. Features of STAR-DRI maltodextrins are listed in Table 3 according to their DE values. Figure 1 graphically represents the changing impact of DE values on key functional properties. Many of the functionalities in Table 3 and Figure 1 are dependent on the ability of STAR-DRI products to control water in food systems.

Viscosity - STAR-DRI products help maintain viscosity and body in various foods, and for this reason they are ideal in reduced fat products. Applications include salad dressings, dairy spreads, and dairy desserts.

Knowledge of the impact of particular STAR-DRI maltodextrins on viscosity is important in formulating and handling food systems. The effect of specific STAR-DRI products on apparent solution viscosities at 100°F is shown in Figure 2.

STAR-DRI maltodextrins are considered economical "soluble" forms of viscosity or body and, therefore, widely used in conjunction with, or as substitutes for, polydextrose.

Osmolality - STAR-DRI maltodextrins are also used for their impact on the osmolality of beverages being used increasingly by athletic and geriatric individuals. Osmolality is a measure, dependent on DE, of the potential for a drop in osmotic pressure across biological membranes. Osmotic pressure differences across membranes can cause a loss or gain of nutrients in the body.

SP 00934

Isotonic solutions exhibit no osmotic difference across membranes. This occurs at about 350 milli-osmolals. Hypertonic beverages are more than isotonic. They can increase the absorption of nutrients into the body.

More nutrient dense beverages can be produced with maltodextrins without adversely affecting osmolality. The effect of the concentration on theoretical osmolality in a series of STAR-DRI products is shown in Figure 3.

High performance sports drinks can be formulated with STAR-DRI maltodextrins to increase carbohydrate loading with a limited increase in osmolality. The use of STAR-DRI 100 maltodextrin provides four times the number of calories, with only a 20% increase in osmolality compared to a commercial sports drink made with a simple sugar. See Table 4.

Figure 1
Effect of Dextrose Equivalent on Properties of Maltodextrins

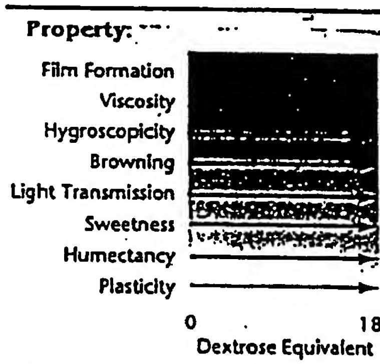
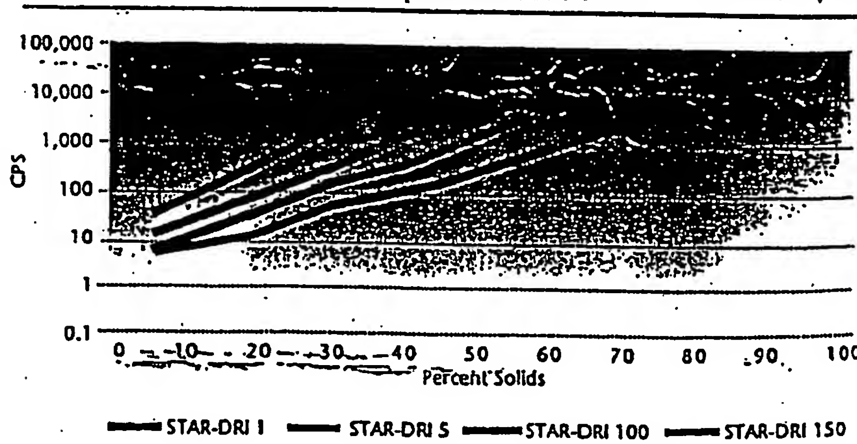


Table 3
Features of Maltodextrins

Feature	Dextrose Equivalent		10	15
Solubility				•
Nutritive value			•	•
Resistance to caking			•	•
Adhesion/Binder		•	•	•
Mouthfeel/Body		•	•	•
Blandness		•	•	•
Encapsulation	•	•	•	•

Figure 2
STAR-DRI Solution Viscosities - Temperature at 100°F



Forms of STAR-DRI Products

STAR-DRI products are available in a number of different forms that facilitate their use in different applications. STAR-DRI products are produced primarily in powder form (standard and agglom... although liquid forms are also made. Bulk density generally correlates to and is used to descri... form of dry powdered products. Several different outcomes are a result of product form and ... Bulk densities and the form of STAR-DRI products are included in Table 1. Visual differences i... the products can be seen in Figure 4.

SP 00935

STAR-DRI Powders - STAR-DRI standard powders are suitable for most applications. They have loose bulk densities of 30 - 40 pounds per cubic foot (0.48 - 0.64 grams/cc.). Standard powders are generally produced via traditional spray drying and are the most common form of maltodextrins.

STAR-DRI Agglomerated Products - STAR-DRI 1005A and 1015A are agglomerated products with bulk densities controlled between 5 and 15 pounds per cubic foot (0.08 - 0.24 grams/cc.). The low bulk densities make the products well suited as bulking agents for use with food microcomponents such as non-nutritive sweeteners. Agglomerated products have good flowability, excellent particle strength, and aid in the dispersion of hard to disperse ingredients (instant starches, for example). Their low tendency to dust makes them highly useful in processes involving demanding physical conditions.

STAR-DRI Maltodextrin Liquids - Liquid forms of STAR-DRI products are especially good for high volume applications involving resolubilization or usage as a drying carrier. Location and special handling requirements may restrict the availability of liquid STAR-DRI products.

Figure 3
Theoretical Osmolality of Maltodextrin Solution

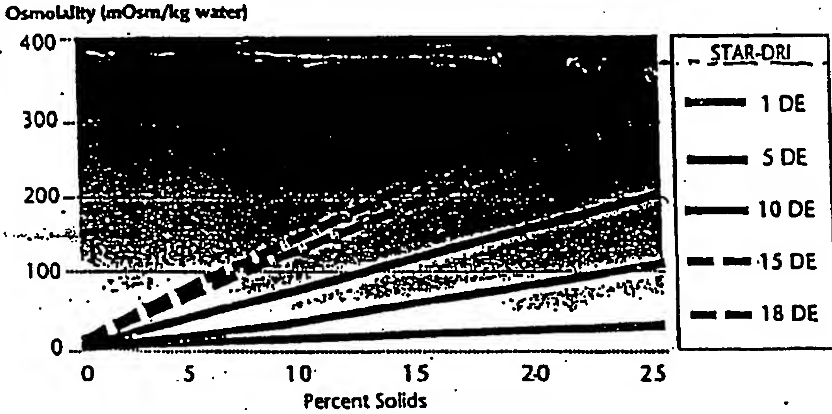
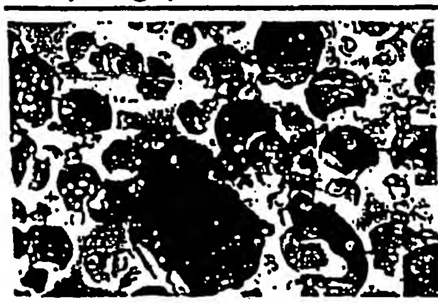


Table 4
Comparison of Two Sports Drinks

mOsm/1000 g H_2O	[illegible]	416
Cal/1000 g H_2O	255	1030

Figure 4
Microphotographs of STAR-DRI Products



STAR-DRI 5 (136X magnification)

STAR-DRI 1015A (140X magnification)

SP 00936

Classic STAR-DRI® corn syrup solids for Traditional and Contemporary Foods

STAR-DRI® corn syrup solids meet the highest of applicable quality standards found in the food industry today. They are traditional ingredients which have been responsible for the success of a wide variety of food and ingredient applications.

STAR-DRI corn syrup solids, with their relatively lower levels of simple sugars, add to complex carbohydrates. Corn syrup solids are useful ingredients in reduction of fats by replacing with carbohydrates.

Typical Properties

The typical properties of STAR-DRI corn syrup solids and applications for these ingredients are listed in Table 4.

Table 4

Typical Characteristics of STAR-DRI Products

Corn Syrup Solids	D.E.	Density [illegible]	Form	Applications
STAR-DRI 200	20	[illegible]	Standard Powder	Adult & Infant Nutritional Formulas, Salad Dressings
STAR-DRI 240	24	38	Standard Powder	Adult & Infant Nutritional Formulas, Salad Dressing
STAR-DRI 42F	44	55	Finely Ground	Frostings, Fondants, Confections
STAR-DRI 42R	44	38	Regular Ground	Meats, Dry Mixes, Ice Cream
STAR-DRI 42C	44	35	Coarsely Ground	Meats, Dry Mixes, Ice Cream

Dextrose Equivalent - Corn syrup solids are classified as having a Dextrose Equivalent (DE) of 20 or greater. DE is a measure of reducing substance and is expressed as glucose equivalent on a total dry substance basis.

The DEs of STAR-DRI corn syrup solids are listed in Table 5.

Density/Form

STAR-DRI 200 powder

STAR-DRI 200 and 240 standard powders have a loose bulk density of between 30 and 40 pounds per cubic foot (0.48-0.64 gr/cc). They are produced via spray drying.

STAR-DRI 42

STAR-DRI 42 corn syrup solids are produced by grinding into particle sizes ranging from fine to coarse. They have loose bulk densities ranging from 35 to 55 pounds per cubic foot (0.56-0.87 g/cc). Generally, finer grades are employed in high solids applications, such as confections, where particle size is important to control grittiness. Coarser grades are used in applications where resolubilization of the product is desired.

Solution Properties of STAR-DRI corn syrup solids

Knowledge of how particular STAR-DRI corn syrup solid products impact the viscosity of a given food system or simple solution is important from formulation and handling standpoints. Figure 5 displays the impact of various concentrations of STAR-DRI products on apparent solution viscosities at 100°F.

SP 00937

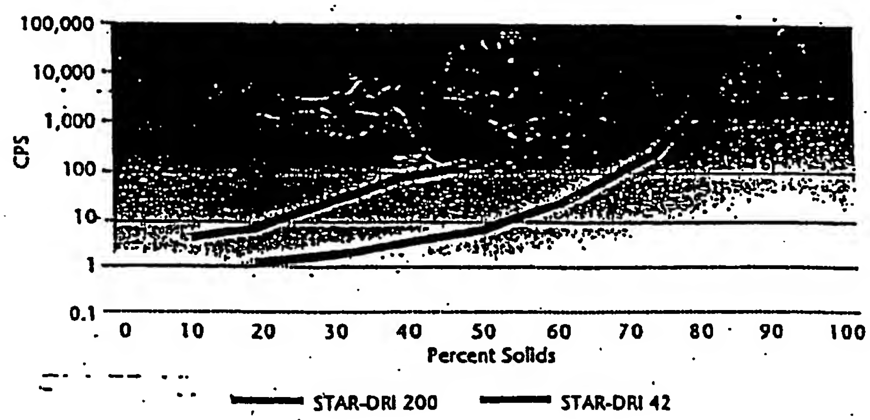
Table 5

Typical Analysis of STAR-DRI Products

Analysis	STAR-DRI Products 200	42
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
Octasaccharide (DP8)	4.0	3.9
Nonasaccharide (DP9)	3.1	3.2
Decasaccharide (DP10)	2.5	2.6
Higher Saccharide (DP11+)	37.1	16.5
Molecular Weight Average, (Mw)	3746	1120
Molecular Number Average, (Mn)	874	490
Polydispersity (Mw/Mn)	4.3	2.3

Figure 5

STAR-DRI Solution Viscosities - Temperature at 100°F



Use of STAR-DRI products is ideal for maintaining viscosity and body as fat content is reduced in products such as salad dressings, dairy spreads and dairy desserts.

Labeling

STAR-DRI 1, 5, 100, 1005A, 1015A, 150, 180 and liquid 3260 products are labeled "Maltodextrin" on ingredient statement panels.

STAR-DRI 200, 240 and 42 products are labeled "Corn Syrup Solids" on ingredient statement panels.

For information on specific declarations, contact your legal counsel or appropriate regulatory agency.

For More Information

Assistance with formulation and selection of the best STAR-DRI product for your application is available. Please call your local Staley sales representative or

Staley

A. E. Staley Manufacturing Company
Starch & Specialty Products Group
2200 E. Eldorado Street
Decatur, IL 62525
1-800-526-5728 or 217/423-4411
FAX 217/421-3167

METHOCEL* cellulose ethers

Colorcon is the sole appointed and approved distributor for HPMC/MC for the Pharmaceutical industry, outside of North America and Japan.

METHOCEL Premium grades have long been used by the pharmaceutical industry. There are two basic premium types, methylcellulose (MC) and hydroxypropyl methylcellulose (HPMC), which meet the standards set by the USP and EP.

Both types of Methocel have the polymeric backbone of cellulose, a natural carbohydrate that is based on a repeating structure of anhydrous units.

METHOCEL Premium HPMC can be used in controlled release hydrophilic matrix systems and controlled release coatings, as granulation binders, in film coatings such as Opadry® and as viscosifiers and suspending agents in liquid systems. Each chemistry - designated E, F and K premium- is also available in a range of viscosity types.

METHOCEL* Premium MC polymers are available under the A chemistry designation in several different viscosity ranges for use as suspending agents in liquid systems.

Applications

Film Coating
Colorcon supplies Opadry®, the complete dry, ready-colored coating system formulated with METHOCEL. Full film-coating details are available from Colorcon. Alternatively, solutions of METHOCEL may also be colored by the addition of an Opaspray® pigment suspension.

Tablet Sealing
METHOCEL is readily soluble in gastric juices and water, thus providing good bioavailability. Being insoluble in sucrose syrup, it is also useful for sealing tablet cores prior to sugar coating.

Thickener and Suspending Agent
METHOCEL is useful in many cream, ointment, suspension formulations, including ophthalmic preparations as a viscosity modifier. E4M and K4M Premium grades are most frequently used.

METHOCEL E types are used in systems requiring high clarity, and where ease of filtration is an important parameter.

Tablet Binder
METHOCEL in the form of E5 and E15 may be employed as binders in the wet granulation of tablet products at a level of 3-5% of finished tablet weight. METHOCEL produces strong granules of uniform size.

METHOCEL E15 produces stronger granules to those made with E5. Care should be taken in formulation since disintegration and dissolution times may be adversely affected with the production of harder granules.

SP 00940

PRODUCTS & SERVICES

Dow Product Finder Results

PRODUCT TRADE NAME	METHOCEL* cellulose ethers
PRODUCT GENERIC NAME	METHOCEL gums, excipients
GLOBAL INDUSTRY	Health Care Food Processing Coatings Building & Construction
PRODUCT AREA	Specialty Chemicals

PRODUCT OVERVIEW

METHOCEL is the tradename for Dow's line of methylcellulose and hydroxypropyl methylcellulose water soluble polymers. METHOCEL polymers are used for water retention, viscosity modification, binding and other functionalities in a wide variety of industrial products, as well as processed foods and pharmaceuticals. Dow markets METHOCEL polymers around the world, and has manufacturing sites in Midland, Michigan, USA, Plaquemine, Louisiana, USA, and Stade, Germany.

PRODUCT GRADES

RELATED PRODUCTS

ETHOCEL* ethylcellulose resins

PRODUCT MARKETS

MARKETS	COUNTRIES/REGIONS
United States	
Mexico	
Canada	
Latin America	
Europe	
Pacific	

CONTACTS AT DOW 1-800-447-4369

SP 00941

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Avicel® RC and CL

Microcrystalline Cellulose and Carboxymethycellulose Sodium, NF, BP

Order a brochure - Avicel RC-591 Microcrystalline Cellulose and Carboxymethylcellulose Sodium, NF, BP.

Product Description

Avicel® types RC-591, RC-581 and CL-611 microcrystalline cellulose and carboxymethycellulose sodium, NF are water insoluble dispersible colloidal excipients used in the preparation of pharmaceutical suspensions and emulsions. These products provide a structured dispersion vehicle exhibiting a high degree of thixotropy, yielding superior suspension stability in a formulation. The primary differences between the types of colloidal Avicel are end product viscosity/gel strength and methods of dispersion required for complete activation. These differences yield a wide selection of alternatives in wet suspensions, dry suspensions, and creams and emulsions.

The high functionality of Avicel RC/CL products relates primarily to the unique rheology characteristics. Avicel dispersions yield a highly thixotropic vehicle, which is primarily the result of the large number of colloidal microcrystal particles that result from full dispersion in aqueous media. The network establishes a weak gel structure with a measurable yield point that prevents drug particles from settling in a formulation. This gel structure is easily broken by mild shaking to yield an elegant, readily pourable liquid. Upon removal of shear the gel structure re-establishes, providing a suspension medium with long term stability against phase separation.

Other advantages of Avicel RC/CL include

- Viscosity regulator and modifier
- Thixotropic characteristics
- Heat and free-thaw stable

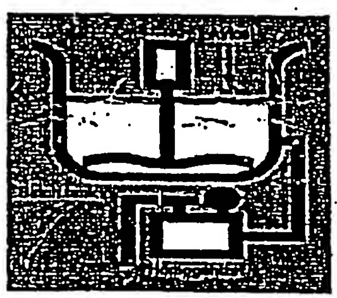
- Long shelf-life stability
- Lengthy hydration times eliminated
- Stable at pH range 4-11
- Odorless, tasteless

Dispersion
Proper, complete dispersion and activation of Avicel RC/CL products is crucial to realize the full performance benefits in a suspension formulation. Upon dispersion, a structured vehicle is established. Continuing with the formulation so as not to disrupt or destroy, the structured vehicle can be accomplished by careful attention to order of addition procedures

The steps necessary to properly disperse each grade of Avicel are described below.

Bulk Dried Avicel Colloidal
This procedure pertains to Avicel RC-581 which requires homogenization for dispersion.
Procedure

- Add Avicel to water while agitating.
- Add protective colloids (if required).
- Agitate 10-15 minutes.
- Add other ingredients.
- Hold the salts and acids until last.
- Homogenize at 200 psi.



Spray Dried Avicel Colloidal
This procedure pertains to Avicel microcrystalline cellulose types RC-591 and CL-611 which require rapid agitation in water for dispersion.

Procedure
Option I: High-speed mixer

- Add Avicel to the water while agitating.
- Follow with a protective colloid if the pH of your

SP 00943

Several case history and formulation examples illustrate the broad utility of these products. Actual formulation details and performance will vary depending types of drug and excipients used in the formulation.

Sample formulations are available

Related Research

Application Bulletins
Under Construction
Bulletins are available upon request

Case Studies
Under construction
Case Studies are available upon request

Regulatory

Regulatory Status for Avicel® RC/CL
Avicel RC/CL colloid-forming, attrited mixtures of microcrystalline cellulose and sodium carboxymethylcellulose meet the standards set forth in the *United States Pharmacopeia/National Formulary* for microcrystalline cellulose and carboxymethylcellulose sodium and in the *British Pharmacopoeia* for dispersable cellulose. Microcrystalline cellulose and sodium carboxymethylcellulose are generally recognized as safe (GRAS) by qualified experts and are in accordance with the United States Food and Drug Regulations. The Avicel RC/CL products are manufactured in accordance with the current Good Manufacturing Practice and are in compliance with the Federal Food, Drug and Cosmetic Act, as Amended.

Additional regulatory information for Avicel RC/CL is available upon request

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General Information

Shelf Life/Stability for Avicel® RC/CL
Store in cool, dry place and avoid exposure to excessive heat.
This product is hygroscopic and should not be exposed to moisture. It should maintain functional properties for

at least two years. Product release specifications are guaranteed at the time of purchase.

Production Sites
FMC has two ISO 9002 registered manufacturing sites to serve our customers. Both our Newark, Delaware and Cork, Ireland facilities manufacture to the same high quality standards using the same cellulose sources. The manufacturing site of origin is clearly stated on the package and certificate of analysis..

Kosher Status
Avicel RC/CL is certified as Kosher. Certificates are available upon request

Safety
MSDS's are available upon request

FMC Corporation
Pharmaceutical Division
1735 Market Street / Philadelphia, PA 19103
1-800-362-3773 / 215-299-6534 / fax: 215-299-6821

Land O'Lakes, Inc.

4001 LEXINGTON AVE. N., ARDEN HILLS, MINNESOTA

Mailing Address: P.O. Box 64101, St. Paul, MN 55164-0101
Telephone: (651) 481-2222

Land O'Lakes Dairy Foods

April 23, 1999

John McNeill
Bodycote Ortech, Inc.
2395 Speakman Drive
Mississaugu, Ontario, L5K 1B3
CANADA

Dear John:

Enclosed is the sample that you requested. Your interest in Land O'Lakes is greatly appreciated. Should you require any additional information, pricing, more samples, or have any questions, please do not hesitate to phone me at 651-481-2230.

Again, thank you for your interest in Land O'Lakes.

Sincerely,

Shellee Arrigoni

Shellee Arrigoni
Sample Order Coordinator
Food Ingredients Division

Enclosure

Land O'Lakes
FOOD INGREDIENTS DIVISION
PRODUCT SPECIFICATIONS

EDIBLE LACTOSE

Product Code: 28453 - Edible Lactose
Product Code: 28452 - Grind 200

Description:

Land O'Lakes Edible Lactose is milk sugar manufactured from high quality sweet dairy whey. It is a white, nonhygroscopic, fine crystalline powder.

Analysis	Typical	Specification
Moisture	0.20%	0.5% Maximum
Total Moisture	5.0%	5.5% Maximum
Lactose (hydrate)	99.5%	99.0% Minimum
Lactose (as anhydrous)	94.5%	94.0% Minimum
Ash	0.1%	0.3% Maximum
Density (gm/ml)	.90 - .95	
Color	White	
Flavor	Very good	Free of off-flavors
Salmonella	Negative	Negative
Standard Plate Count	500/gram	10,000/gram Maximum
Coliform	10/gram	10/gram Maximum
Yeast	10/gram	20/gram Maximum
Mold	10/gram	20/gram Maximum

Typical Sieve Size - Alpine Unit

Edible	Through #30	- 95%	
Lactose	Through #60	- 50%	
Grind	On #200	- (74 Microns)	15% Maximum
200	Through #200	- (74 Microns)	85% Minimum

(Utilizing Alpine's Air Jet Sieve, Alpine American Corp.)

Uses:
Cream Cheese, Cheese Food and Spreads
Infant food, Health and Geriatric Foods, Special Diet Formulations
Chocolate and Fruit Flavored Drinks, Bakery Goods, Candy

Advantages:
Has the useful properties of solubility, low sweetness, flavor enhancement, browning and tenderizing.

Packaging:
50 pound bag

SP 00947

Land O'Lakes, Inc., Food Ingredients Division, P.O. Box 116, Minneapolis, MN 55440 612-481-2222

Land O'Lakes, Inc.

4001 LEXINGTON AVE. N., ARDEN HILLS, MINNESOTA

Mailing Address: P.O. Box 64101, St. Paul, MN 55164-0101
Telephone: (651) 481-2222

Land O'Lakes Dairy Foods

COMMERCIAL INVOICE

To: Bodycote Ortech, Inc.
2395 Speakman Drive
Mississaugu, Ontario, L5K 1B3
CANADA

Date: April 23, 1999

Telephone: 905-822-4111, x 332

Country of Export: United States

Attention: John McNeill

Ship Via: Regular UPS **Sample Request Number:** 23396

No. of Pkgs.	Qty.	Item Weight Lb.	Item Weight Oz.	Country of Manufacture	Complete Description of Contents	Unit Value Per Pound	Sub Total	Gross Weight
1	1	1		United States	Lactose Grind 30 (Dried Nonperishable Food Item)	USD .20 No commercial value-not for resale Lab analysis only	USD .20	
Total		1				Total Value for Customs Purposes Only	USD .20	

Signature: Shelley Arrigoni

Sample Order Coordinator
Food Ingredients Division

I/We hereby certify that the information on this invoice is true and correct and that the contents of this shipment are as stated above. I/We do hereby authorize Courier to execute any additional documents necessary for the export of merchandise described herein on my/our behalf.

New Zealand Milk Products
(North America) Inc.

3637 Westwind Blvd.
Santa Rosa, CA 95403
Phone: (707) 524-6600

DATE: 5-13-99
ORDER NUMBER: 91619
PHONE NUMBER 905-822-4111

SHIP VIA: FED EX INT'L ECONOMY
SAMPLE TO ARRIVE BY:
FED EX NUMBER:

COMPANY: BODYCOTE ORTECH
ATT: JOHN MC NEIL
ADDRESS: 2395 SPEAKMAN DRIVE
CITY: MISSASSAUGA, ONTARIO
STATE: ZIP: L5K - 1B3 COUNTRY: CANADA

Sample Request

Thank you for your interest in milk protein ingredients from NZMP.
We are pleased to supply you with the following samples:

Description	Item No.	Lot No.	Weight	Qty
ALANATE 180	13C180	4874-R0038	1 LB.	1
TMP 1230	211230	M8265	1 LB.	1

Product Bulletins
Product Brochure

Please call 800-358-9096 for additional information:
Brian Kipping 905-274-0545
- For product information - Technical Service
- For price and availability - Customer Service

Milk Protein from New Zealand. The Protein of Choice.™

Originator: Carol Meredith
CC: Brian Kipping
CC:

PRODUCT BULLETIN

TMP 1230
Milk Protein Isolate

TMP 1230 is a spray dried, flavor-reduced, soluble protein manufactured by an exclusive process in which casein and whey proteins are isolated together from fresh skim milk. The nutritive value and functional versatility of casein and whey proteins are mutually enhanced to form a unique milk protein ingredient. TMP 1230 is a highly soluble product with very good emulsifying and water binding properties.

PRODUCT CHARACTERISTICS

- Excellent nutritional quality (PER = 2.8)
- High fat and water binding capacity
- Excellent emulsifying properties
- High viscosity in water solutions
- Excellent water solubility
- Low flavor profile
- Kosher

TYPICAL COMPOSITIONAL ANALYSIS

Protein (N x 6.38) %	88.7
Ash %	5.8
Moisture %	4.3
Fat %	1.1
Lactose %	0.2
Antibiotics	Negative

TYPICAL MINERAL ANALYSIS

Sodium %	0.8
Calcium %	1.6
Potassium %	<0.02
Phosphorus %	0.8
Magnesium %	<0.03

RECOMMENDED LABELING

Milk Protein Isolate

SUGGESTED USES

- Puddings
- Pie fillings
- Frozen desserts
- Moist and chewy cookies
- Acidified dairy products

TYPICAL MICROBIOLOGICAL ANALYSIS

Standard plate count (cfu/g)	<1,000
Coliforms (cfu/g)	<10
E. coli (1g)	Negative
Yeast & mold (cfu/g)	<50
Staph. coag. pos. (1g)	Negative
Salmonella (100g)	Negative

TYPICAL PHYSICAL PROPERTIES

Color	White to light cream
Flavor & odor	Bland and clean
Bulk density (packed)	0.44 g/ml
pH (5% at 20°C)	7.8
Sediment (25g)	Disc A

PACKAGING

Stitched, multiwall kraft paper bags. Polyethylene bag liner individually closed. No staples or metallic fasteners.

Net wt.	50.0 lbs (22.7 kg)
Gross wt.	50.8 lbs (23.1 kg)

STORAGE

Milk protein isolates are hygroscopic and can absorb odors. Therefore, adequate protection is essential. Temperatures below 25°C, relative humidities below 65%, and an odor-free environment will extend the storage life. Stocks should be used in rotation, preferably within six months.

NEW ZEALAND MILK PRODUCTS, INC.

3637 Westwind Boulevard, Santa Rosa, California 95403 • Telephone 707-524-6600 800-358-9096

SP 00950

PRODUCT
BULLETIN

ALANATE 180

Sodium Caseinate

Specification No. 13C180 or 13C188

ALANATE 180 is a spray dried, flavor reduced milk protein. Due to a continuous process, this caseinate has excellent flavor and can be easily incorporated into flavor-sensitive food formulations.

TYPICAL COMPOSITIONAL ANALYSIS

Protein (N x 6.38)%	92.7
Ash %	3.5
Moisture %	4.2
Fat %	0.8
Lactose %	0.1
Antibiotics (IU/g)	<0.01

TYPICAL MINERAL ANALYSIS

Sodium %	1.2
Calcium %	<0.1
Potassium %	<0.02
Phosphorus %	0.8
Magnesium %	<0.03

TYPICAL NUTRITIONAL ANALYSIS

Calories (Kcal/100g)	380
Calories from fat (Kcal/100g)	7
Fiber (g/100g)	0
Cholesterol (mg/100g)	20
Saturated fat %	0.5
Fatty Acid Profile	*
Vitamin A (IU/100g)	<20
Vitamin C (mg/100g)	<0.4
Vitamin Profile	*
Amino Acid Profile	*

** Technical Bulletin available upon request*

RECOMMENDED LABELING

Sodium Caseinate

SUGGESTED USES

- Whipped toppings
- Coffee whiteners
- Cream liqueurs

PRODUCT CHARACTERISTICS

- Excellent emulsifying properties
- Excellent water solubility
- Excellent whipping properties
- Excellent flavor
- Kosher

TYPICAL PHYSICAL PROPERTIES

Color	White to light cream
Sensory	Clean
Bulk density (packed)	0.52 g/ml
pH (5% at 20°C)	6.6
Sediment (25g)	Disc A

TYPICAL MICROBIOLOGICAL ANALYSIS

Standard plate count (cfu/g)	<1,000
Coliforms (cfu/g)	<3
E. coli (1g)	Negative
Yeast & mold (cfu/g)	<10
Staph. coag. pos. (1g)	Negative
Salmonella (750g)	Negative

NEW ZEALAND MILK PRODUCTS, INC.

3637 Westwind Boulevard, Santa Rosa, California 95403 • Telephone 707-524-6600 800-358-9096

SP 00951

Issued 02/01/97
Supersedes 180/8048.2

CURRICULUM VITAE

Surname:	Hartley
Given Names:	Robert Alexander
Date of Birth:	23rd February, 1928
Place of Birth:	Wellington, India
Father's Name:	Robert Hartley
Father's Nationality:	British
Mother's Name:	Annie Josephine Hartley, nee Collins
Mother's Nationality:	British
Marital Status:	Married
Wife's Name:	Olive Hartley, nee Howles
Children:	Two Daughters, Two Grandchildren
Nationality:	Dual Citizenship - British and Canadian

Education:

(1) In England:

School Certificate - Nine subjects, 1943
Higher School Certificate - Pure Mathematics, Applied Mathematics, Physics and Chemistry, 1948
National and Higher National Certificates in Chemistry, 1945 and 1947
Associate of Royal Institute of Chemistry, April, 1952
B.Sc. (Special) in Chemistry (University of London), 1952
Elected Fellow of Royal Society of Chemistry, 1984

(2) In Canada:

Corrosion Courses, McGill University, Montreal, 1960-62
Accountancy Courses, McGill University, Montreal, 1971-72

Awards:

Scholarship to Royal Grammar School, Colchester, 1939
Technical State Scholarship, 1947
Chemical Institute of Canada Protective Coatings Award - Winning Paper, 1961

Affiliations:

Chartered Chemist - Royal Society of Chemistry
Corrosion Specialist - National Association of Corrosion Engineers
Member of American Society of Naval Engineers
Member of Montreal Society for Coatings Technology

Career:

1943 - 1947	Laboratory Assistent. S. Heap and Sons Ltd., Rochdale, England
1947 - 1948	Laboratory Assistant. I.C.I. Ltd., Manchester, England
1952 - 1955	Technical Trainee. International Paints Ltd., Felling, England
1953 - 1954	Part Time Lecturer. Rutherford Technical College, Newcastle upon Tyne, England.

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Career cont. - All subsequent positions are with International Paints

1955 - 1956	Plant Manager. Vancouver, B.C., Canada. Responsible for Manufacture, Quality Control, Some Formulation Development, Customer Contact.
1956 - 1960	Chief Chemist. Montreal, P.Q. Responsible for about 15 personnel. Developed Latex, Trade Sale and Industrial Alkyds, Epoxies, Vinyls, Polyurethanes, Chlorinated Rubber, Baking Enamels, etc. Systems for Refineries, Hydroelectric, St. Lawrence Seaway, Aircraft and Ground Equipment, etc.
1960 - 1965	Technical Manager. Montreal, P.Q. Responsible for R & D., Technical Sales, Technical Enquiry Agent for group use. Developed Pipecoatings, Acrylic Subway System, Epoxy Marine Systems, Zinc Rich Primers, Locomotive Paints, Coal Tar Epoxies, Internal Epoxy Novolac coatings for cast iron potable water mains, etc.
1965 - 1968	Vice President (Technical). Montreal, P.Q. Responsible for all technical matters, quality control and paint manufacturing at three plants. New high speed production techniques introduced and associated new facilities. Universal Colourant Systems. Technical Sales.
1968	Technical Director. Felling, England. World wide responsibility.
1968 - 1970	Chief Executive, Felling Site. Rationalisation of production from several sites. Closure of sites. Plant renovation. Introduction of High Speed Production. Responsible for about 600 personnel on 42 acre site.
1970 - 1977	Vice President (Technical). Montreal, P.Q. Responsible for all technical and production. Four Plants. Technical Sales. Plant Renovation. New products included Urethane/epoxy system for subway cars, One pack zinc silicates, Pipecoatings, New trade sale products. Organised protective coatings on world wide basis - survey conferences, etc.
1977 - 1981	Senior Vice President (North America). Union, N.J., U.S.A. Responsible for technical matters for Canada and U.S.A. Assisted on protective coatings. Technical Sales. New product development.
1981 - 1985	Vice President (Technical Sales). Montreal, P.Q. Conferences Meetings, Training courses, Lectures, Specification and Product Manuals, Customer complaints, Customer presentations. Marketing of Products and Systems.

Areas of Activity:

(1) Film Formers. Experienced with wide variety including alkyds, oleoresinous, epoxies, silicates - alkyl and aqueous, polyurethanes, vinyls, acrylics, chlorinated rubber, PVA and acrylic latices, coal tar and hydrocarbon resin modified epoxies, bituminous, baking vehicles, eg. U/F, M/F, acrylic

(2) Types of Coatings.
(A) Protective Coatings. Standard and high build primers for steel, light alloys and galvanised steel. High build epoxies. High solids and solventless epoxies. All generic types of topcoats. Coatings for

... / 3

resistance to total or intermittent immersion in fresh or salt water, crude oils, petrochemicals, solvents, chemicals, etc. Temperature resistant coatings. Pipecoatings. Tank coatings.

(B) Marine Coatings. Preconstruction primers. Anticorrosives. Antifoulings. Tank linings. Abrasion and ice resistant coatings. Yacht paints.

(C) Others. Trade sales paints. Aircraft finishes. Specification paints. Some knowledge of epoxy powder coatings, baking finishes.

(3) Research and Development. Direction and evaluation of programmes leading to commercial products for trade sales, heavy duty marine and protective coatings. Limited experience in industrial baking finishes, aircraft and epoxy powder coatings.

(4) Technical Organisation. The connection between various laboratories, quality control, production departments, technical sales, sales departments, and customers. Multiplant operations.

(5) Manufacturing. Introduction of high speed impeller dispersion, sand and media attritor mills, integrated production lines. Universal colourant systems for retail and industrial/heavy duty coatings. Colour measurement. Upgrading old plants and warehouses. Closing of plants. Transfer of production and warehouse functions. Some knowledge of cost accounting.

(6) Technical sales. Much experience of customer contact at all levels, dealing with their requirements and complaints. Formulating and producing products and systems specifically for their requirements. Lectures and educational courses. Writing of technical sales manuals, product data sheets, specifications, etc. In house technical and sales conferences, education and training programmes.

(7) Industrial experience. Shipyard new construction, eg. icebreakers, naval vessels, crude oil and product carriers, lakers, LNG carriers, semisubmersible and jack up rigs etc. Pipe mills, both steel and cast iron. Railroad equipment eg. locomotives, hopper cars, etc. Subway cars. Structural steel fabricators. Hydroelectric structures. Refineries. Gas processing plants. Petrochemical plants. Pulp and paper plants. Gas and oil transmission companies. Municipal engineers for water-lines. Consulting engineers. Airline companies. Potash processing.

(8) Legal and patents. Have appeared as expert witness in three court cases. Patents issued in three countries for multicolour trade sales and asphalt modified epoxy coatings.

Partial list of Lectures and Papers given

(1) Coatings for Marine Conditions. Society of Naval Architects and Marine Engineers (SNAME) Montreal. 1957.

(2) Combatting Corrosion. Engineering Institute of Canada. Montreal. October, 1961.

(3) Surface Coatings for Marine Conditions. Chemistry in Canada. (1961 Chemical Institute of Canada Protective Coatings Award - Winning Paper) March, 1962.

... / 4

(4) Prevention of Corrosion of Cast Iron Water Pipes by Plastic Coatings. Western Canada Water and Sewage Conference. Calgary, Alberta. September, 1962.

(5) Surface Preparation. National Association of Corrosion Engineers (NACE) Montreal. September, 1964.

(6) Modern Coatings for Marine Use. Society of Naval Architects and Marine Engineers. Saint John, N.B. December, 1965.

(7) Surface Coatings and Corrosion Control. Index 67. Regina, Sask., August, 1967.

(8) Internal Pipecoatings for Natural Gas Lines. The Institution of Gas Engineers, London, England. June, 1968.

(9) Coatings and Corrosion. Offshore Technology Conference. Paper OTC 1466. Houston, 1971.

(10) Coatings and Corrosion. Journal of Materials (A.S.T.M.) Volume 7, Number 3, Pages 361-379, September, 1972.

(11) Prevention of Corrosion by Coatings. National Association of Corrosion Engineers. Montreal. December, 1973.

(12) Hull Roughness, Antifouling Coatings and Ship Performance. Society of Naval Architects and Marine Engineers. Shipboard Energy Conservation Symposium. New York, September, 1980.

(13). Ships Tanks. Aspects of Corrosion Control: Tank Coatings and their Performance in Different Environments and Cargoes. Their Surface Preparation, Application and Hazards. American Society of Naval Engineers (A.S.N.E.) Symposium - Innovations for the 80's. Seattle, 1981.

(14) Comment Combattre la Corrosion. L'Ingenieur. Numero 351, 68e annee, pages 19-21, Septembre, 1982.

(15) Zinc Rich Primers - Types and Performance. Potash Industry Symposium. Saskatoon, Saskatchewan. Pages 503-509. 1983.

(16) Aspects of Corrosion Control in Ships' Tanks. Naval Engineers Journal (A.S.N.E.) Volume 96, Number 1, pages 33-52, January, 1984.

(17) Counter Attack in the Effluent Society (Co-author M.W. O'Donoghue) B.C. Water and Waste Association. Eleventh Annual Conference. Victoria, B.C. April, 1984.

(18) Increased Efficiency in Shipyard Painting Operations. 36th Annual Technical Conference. Canadian Shipbuilding and Ship Repairing Association. Pages 327-349. Montreal. February, 1984.

(19) Coatings, Contaminated Surfaces and Low Temperatures. 37th Annual Technical Conference. Canadian Shipbuilding and Ship Repairing Association. Pages 113-135. Montreal. February, 1985.

(20) Coatings for the Interior of Natural Gas and Water Pipelines. Inter Tech 85 Conference. Moscow, U.S.S.R. 1985.

(21) Aspects of Corrosion Control and Protective Coatings for Cold Ocean Applications - A Review. Seminar on New and Improved Materials for Cold Ocean Applications. Technical University of Nova Scotia, Halifax, N.S. December, 1985.

Hobbies: Cross Country Ski-ing, Music, Military History, Fishing.

Curriculum Vitae (continued)

1986-1992 and 1996 to 1998 — Self employed consultancy. Some of the clients and projects included:

(a) International Paints, Canada, U.S.A. and England
- Research and Development management
- training courses.
- environment study on cuprous oxide and cuprous thiocyanate for use in antifouling coatings.
- Workplace Hazardous Materials Information System (WHMIS) for Canadian plant

(b) -Canadian Department of Defence. Adhesion of ice to coatings. In conjunction with Ontario Research Foundation.

(c) -Benjamin Moore and Co., Montvale, N.J. Establishment of heavy duty protective coatings division.

(d) -Legal expert witness for
- -International Paints,U.S.A..
- -Nor-Lag Ltee., Montreal. Mercier Bridge.
- -Avenor Inc.,Pulp and Paper Mill.
- -Mackinnon and Olding,N.S. Tanker Corrosion.

(e) -Jones Power, N.S. Electricity generating plant

(f) -Shaw Pipe Protection Ltd., Epoxy Chemistry

(g) -Saint John Shipbuilding, N.B. Coatings on Navy vessel

1992 - 1995 S.G.Pinney and Assoc. Inc.,Professional Engineers, Fla.
Various projects including:
- -General Motors, Diesel Div., Paint line evaluation
- -Vermont Agency of Transport, Paint failure on bridge
- -Weldable primers for U.S.Navy. Mil.Sealift Comm.
- -Coatings failure, Mil. Sealift Command, U.S.N.
- -Cornell Industries, N.J. Frankford Elevated Railway.
- -Stolt Nielsen, Houston; Various corrosion problems.
- -Sears Oil, N.Y. Tank coatings, Corrosion.

Dear David

Memorandum from Mr S ~~Bytnar dated~~ 11-25-97 received 12-1-97

Thank you for letting me see the polemical diatribe where Mr Bytnar wrongly assumes that there is a plot to push the use of $MgCl_2$ and that I have been 'informed' to slant the data'. I do not know 'Daren' and I have had no contact with the manufacturers/agents of $MgCl_2$, $CaCl_2$ and NaCl. This impugning my honesty as a consultant verges on character assassination and could be the subject of legal process. There is absolutely no reason for Mr Bytnar to behave in such a manner. He does not know me, nor my background and experience.

I do not feel that I have to justify myself to Mr Bytnar but he might be interested in some aspects of my career to date. I am a graduate in Chemistry with a minor in Physics from the University of London, England. I passed the examination for Associateship of the Royal Institute of Chemistry at during the same year I graduated. I was elected a Fellow of the Royal Society of Chemistry and am a Chartered Chemist. I have studied corrosion and coatings since 1952 when I joined International Paints in England. I have been a member of the National Association of Corrosion Engineers (Houston) since 1959 and am an accredited Corrosion Specialist (Number 2803). Post graduate studies on corrosion were undertaken at McGill University, Montreal, as well

Some of the more interesting aspects of my career include

- appointed Vice President (Technical) in Canada in 1965, responsib for 3 plants and two laboratories. About 220 people
- Chief Executive at International Paints main site in England 1968-70. Site of 42 acres, 630 people, two laboratories (one R & D) with 130 chemists, manufactu synthetic resins, various chemicals, coatings & paints
- Senior V.P. (Technical) for North America 1977-1981 Responsible for laboratories in Montreal, T[illegible] Union N

[illegible]
and Houston, Texas.

ATTORNEY'S EYES ONLY

CONFIDENTIAL

After taking early retirement from in 1986 I was prevailed upon by my old employer (Int. Paints) to act as a consultant for Canada, U.S.A. and England. This I did for about 4 years forming my own consulting company to do this. Then I became a Senior Associate with the S.G. Pinney & Associates Inc., Port St. Lucie, Fla. and retired due to ill health almost two years ago. As a consultant I dealt with numerous problems:

- corrosion and paint failure on U.S. Navy support vessel
- weld through primers for U.S. Navy.
- adhesion of ice to paint coatings for Royal Canadian Navy. This resulted in a paper published in the Journal of Coatings Technology, Vol. 64, No 815, Dec. 1992 entitled "Adhesion of ice to coatings and the performance of ice release coatings".
- corrosion problems on various bridges e.g. Ben Franklin bridge in Philadelphia, road bridges at Ottawa and Montreal, Mercier Bridge in Montreal. The latter resulted in legal proceedings where I acted as "expert witness". Also bridges in New York and Vermont.
- corrosion & coating problems on assorted items e.g. pulp & paper mill at Gatineau, Quebec; overhead railway, Philadelphia, diesel-electric locomotives made by General Motors, London, Ontario; thermal generation plant, Nova Scotia.

- training courses for two paint companies & corrosion/coating training courses presented to various highway departments e.g. Vermont, New Hampshire, Connecticut, Virginia.

In addition I have written, presented &/or had published some twenty five papers on coatings and corrosion. Enclosed is my curriculum vitae which goes as far as 1986 - since I am not seeking employment I did not bring it up to date. Appendix A s C.V.

CONFIDENTIAL

Upon reflection I am amused at the concept of a plot and that we conspirators would assume that Mr Bytnar "would not be smart enough to interpret the purpose of the report." I wonder where the "Hartley Plot" stands in the American Pantheon of Plots e.g. assassination of JFK, suicide of Marilyn Monroe, Whitewater etc !! Is there an American gene which causes this ?

To put the record straight, you asked me to examine the information available on Ice Ban with and without salts and to give you my considered opinion. In addition you wanted a simplified report which could be used by your sales personnel in their endeavours. Although (in my opinion) there was a paucity of "hard" information (lab reports, published papers etc) there was much anecdotal information, which necessitated careful examination. As I informed you several times by telephone

- Ice Ban does have most useful properties particularly film formation, corrosion inhibition, ~~the~~ ice melting etc.
- the best de-icing results would be with chloride salts and possibly CMA, if your clients could afford it.
- you should market what your clients know and request. I suggested IB/$CaCl_2$, IB/$MgCl_2$ and IB/CMA. In retrospect I think you should also offer Ice Ban / NaCl, the latter should be effective, to maybe down to about 5°F since the eutectic point of NaCl is −6°F / 23% concentration (Watch for the mushroom cloud over Marshall, Mn)

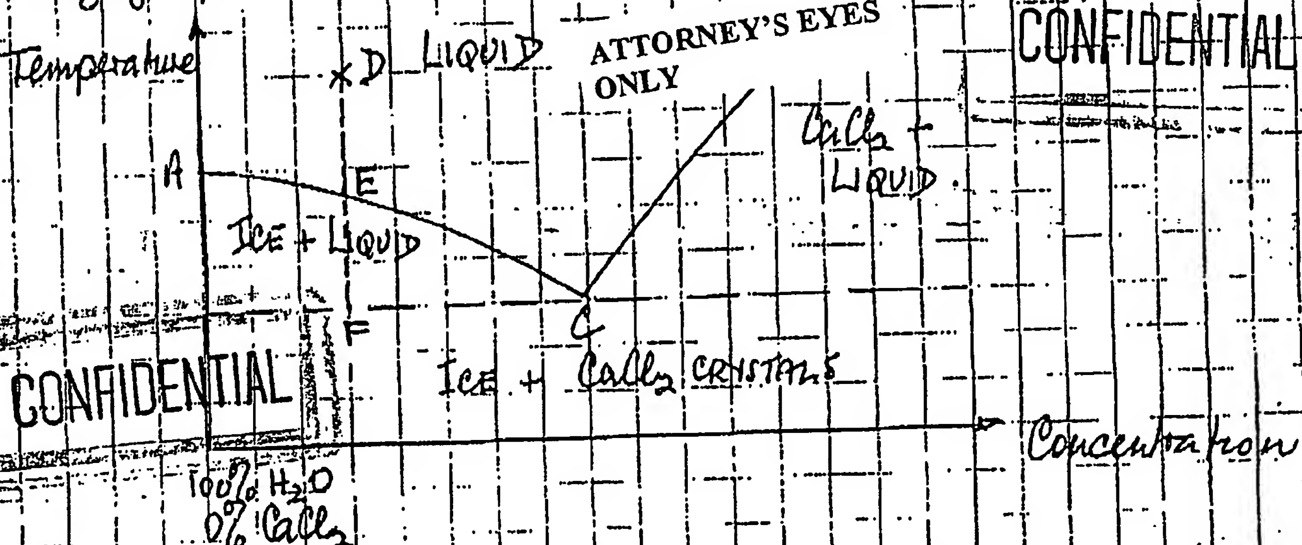
Your objective, of course, is to sell as much Ice Ban as possible. If I thought Ice Ban was useless I would have told you so and the reasons for coming to this conclusion.

Having wasted all this time in dealing with Mr Bytnar's gratuitous and irrelevant comments let us now try and deal with the technical points raised in Mr Bytnar's fax of November 25, 1997:-

(1) Commencement of freezing ~~[illegible]~~ This came from my reading of physical chemistry text-books on the Phase Rule

e.g. (a) Alexander Findlay "The Phase Rule and its Applications" Nineth Edition
(b) Samuel Glasstone "The elements of Physical Chemistry" 5th E
(c) P. W. Atkins "Physical Chemistry" Third Edition 1986

What I tried to say was that on a temperature/concentration phase diagram taking a point where the de-icer is completely liquid (Point D) and cooling the liquid to point E on the freezing point curve AC / B



At point E freezing will commence with ice crystals beginning to form. Between E and F there will be a mixture of ice crystal and liquid with more & more ice crystals being formed as the temperature lowers. At F (the eutectic temperature) the mixture sets to a solid frozen mass consisting of small, intermingled crystals of ice and $CaCl_2$

Concerning the freezing points I am not sure what Mr. Bytner is referring to. The eutectic points were obtained
(a) for $MgCl_2$ from Dale Keeps excellent paper
(b) for $CaCl_2$ from a table entitled "Freezing points, densities and concentrations of the calcium chloride brines, pages 2309, 2310 Handbook of Chemistry and Physics Editors Hodgman C.D., Weast R.C. and Selby, S.M. Publisher Chemical Rubber, Cleveland, Oh. 1958

I plotted freezing point curves for both $MgCl_2$ and $CaCl_2$

12-2-97

D Wood (contd)
and found

	$MgCl_2$	$CaCl_2$
Commencement of freezing	15.7°F	20.7°F
Eutectic temperature	−27°F	−60°F

(2) Ice Melting Data. This came from an advertisement from the Dead Sea Works Ltd dated 1995. I cannot believe a reputable company would publish lies. Enclosed as Appendix B.

(3) Spalling Data. Again from Appendix B. Here I assumed that the Ice Ban would not interfere in the spalling mechanism – neither pro nor con. I would be most interested to see Mr Bytnar's results.

(4) Corrosion testing. This is indeed complex and as a Corrosion Specialist of many years standing and having run many thousands ~~of~~ corrosion tests I know that it is extremely easy to misinterpret results. Corrosion engineers, on a world wide basis, use standard tests such as ASTM or ISO. I need to correlate and compare Bytnar's and Keep's results with what I know and have used. I am certainly not doubting their results.

My comments on Phytic Acid came directly from the book Mr. Bytnar so kindly sent me. Essentially I understood that phytic acid exists as the Ca & Mg salt. Free phytic acid appears to be unlikely. Also if free phytic acid occurs then mixture with $CaCl_2$ or $MgCl_2$ would, I believe, form the corresponding Ca or Mg phytate.

There are other possibilities why Ice Ban has inhibitive properties and it would be useful to use standard methods to evaluate and understand this inhibition.

(5) Viscosity. In a telephone call with Mr. Bytnar on 10-29-97 we discussed quality control and Mr Bytnar suggested

Total Solids	48 to 52% by wt
Viscosity	300 to 400 cps at 77°F
Sp. Gravity	.238 at 60°F
pH	3.5 to 3.9

The above is taken from my notes of that 3 way conversation. Do you remember that David?

CONFIDENTIAL

(6) Dilution of Solution. I think I understand ~~this~~ but would like Mr Bytnar write me a one or two paragraph explanation. Since I have No data on the melting characteristics of Ice Ban I could not include it in my calculations. In any event the Ice Ban component would be common to both Ice Ban/$CaCl_2$ and Ice Ban/$MgCl_2$.

I know that any soluble material lowers the freezing point according to Raoult's Law. The inorganic salts are more efficient at reducing freezing points than organic materials. The following is taken from pages 2298 and 2299 Handbook of Chemistry and Physics.

MOLAL LOWERING OF FREEZING POINT (°C) FOR AQUEOUS SOLUTIONS.

At 0.10 Molal Concentration (i.e. gram formula weight/1000g H_2O)

$CaCl_2$	4.83	
$MgCl_2$	4.94	
NaCl	3.48	
Dextrose	1.86	
Citric acid	2.03	
Glycerol	1.87	(for 0.2 M)
Sucrose	1.88	
Ethanol	1.83	

CONFIDENTIAL

ATTORNEY'S EYES ONLY

(7) Comments in General. I know only too well that there is much that I do not know about Ice Ban and the vicious competitive de-icing market. I hoped that I could learn from Mr Bytnar and looked forward to working with him. If my theories and facts are wrong then please show me. At the age of almost 70 yrs I am still most willing to learn. We need more light and less heat!

Regards, Bob.

SP 00562

A/PROV

01/07/98
1c549 U.S. PTO

60070636.010798

PP 'SIONAL APPLICATION COVER S 'T

Our Docket No. 781_002

THIS IS A REQUEST FOR FILING A PROVISIONAL APPLICATION UNDER 37 CFR 1.53(b)(2).

INVENTOR(S) APPLICANT(S)			
LAST NAME	FIRST NAME	MIDDLE INITIAL	RESIDENCE (CITY AND EITHER STATE OR FOREIGN COUNTRIES)
Hartley	Robert	A.	Inverary, Ontario (CANADA)
Wood	David	H.	Ava, New York

TITLE OF THE INVENTION: (280 Characters Max)
DEICING SOLUTION

CORRESPONDENCE ADDRESS:

Owen D. Marjama
WALL MARJAMA & BILINSKI
217 Montgomery Street
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ENCLOSED APPLICATION PARTS (Check all that apply)

- ☒ SPECIFICATION — NO OF PAGES 8
- ☒ CLAIMS — NO OF PAGES 3
- ☒ ABSTRACT — NO OF PAGES 1
- ☒ DRAWING(S) — NO OF SHEETS 0
- ☐ RECORDATION COVER SHEET & ASSIGNMENT TO ____________
- ☐ OTHER (SPECIFY) ____________

METHOD OF PAYMENT

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Respectfully submitted,

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PATENT APPLICATION SERIAL NO. ____________

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

02/03/1998 CSTREATE 00000038 60070636
01 FC:114 150.00 OP

PTO-1556
(5/87)

DEICING SOLUTION

Background of the Invention

The current state of the art for coping with snow and ice on roads usually involves applying a deicer material such as a salt to the road surface. Sometimes antiskid materials such as sand or other aggregates such as gravel are added with or without a salt.

The use of salt and salt containing compositions having high concentrations of salt, cause an undesirable corrosive effect on vehicles, the road surface, and the environment with respect to the run off of water containing salt which contaminates the surrounding land and water.

Considering the above problems associated with the addition of salt formulations, there has been a continuing need for a deicing composition or formulation which can effectively melt snow and ice yet which reduces the corrosion and environmental contamination referred to above. In response to the above problems associated with the use of road salt, the prior art has looked to alternative formulations which are less corrosive and more environmentally friendly.

U.S. Patent 5,635,101 (Janke et al.) relates to a deicing composition containing a by-product of a wet milling process of shelled corn. Corn kernels are steeped or soaked in a hot solution containing small amounts of sulfurous acid. The corn kernels are separated from the steep water and steep water solubles are used in the production of a deicing composition.

U.S. Patent 4,676,918 (Toth et al.) relates to a deicing composition which comprises a mixture containing at least one component selected from a number of chlorides or urea and an admixture of waste concentrate of alcohol distilling that has a dry substance content of from 200 to 750 g/kg and from 10% to 80% by weight of water.

Both Janke et al. and Toth et al. materials are naturally occurring substances with hundreds (if not thousands) of components such as complex carbo-hydrates, starches, sugars, proteins etc. and are normally used with a salt. These materials may not form a film at low temperatures, and therefore only immobilize the salt by the resulting large increase in viscosity.

The above de-icing solutions now being introduced in the field employ agricultural residues e.g., corn based distillers solubles, brewers condensed solubles and solubles from the corn wet milling industries steep water. These naturally occurring substances are extremely variable in composition, viscosity, film forming tendency, freezing temperature, pH etc., and consequently give varying performance when used in de-icing solutions. Depending upon the source and batch, these materials at low temperatures sometimes exhibit such resistance to flow that they cannot be effectively applied evenly to a road surface, rendering them virtually unsuitable for use.

To improve quality and performance, and to meet current mandated standards, there is an immediate need for synthetic, chemically modified and naturally occurring film formers, and carefully purified naturally occurring materials for freezing point depressants, which can be substituted for the currently used agricultural residues. Such a formulation would improve performance and reduce metal corrosion, spalling of concrete, toxicity and overcome environmental concerns.

It is therefore an object of the present invention to provide a deicing formulation which exhibits improved performance standards which overcomes the prior art problems described above.

It is a further object of the present invention to provide a deicing formulation which provide consistent physical and chemical properties and exhibit less corrosion.

It is another object of the present invention to provide an economical, highly effective deicing formulation.

Summary of the Invention

The present invention is based upon the discovery that the use of a combination of three key components in a deicing formulation overcomes the problems of the prior art described above. The three components comprise a

freezing point depressant, film former and water. These film formers are water soluble and water resoluble, and preferably comprise colloidal or emulsion materials dissolved in water. The freezing point depressants 'melt' the ice and snow and keep the resulting ice/snow/de-icer/ water layer liquid down to known (and defined) lower temperature limits, aiding removal and improving road safety. The film former immobilizes the freezing point depressant onto the road surface (preventing run-off), improves efficiency of ice melting, and can reduce metal corrosion down to acceptable levels. The freezing point depressants include conventional salts and selected organic materials used alone or in admixture.

Detailed Description of the Invention

The present invention relates to a deicing formulation which includes as its key components a freezing point depressant, a film former and water. The freezing point depressant may comprise any suitable inorganic or organic material and mixtures thereof. Suitable materials includes chlorides such as Na Cl, Ca Cl_2, Mg Cl_2, and KCL. Also included are sodium acetate, potassium acetate, and calcium magnesium acetate. Suitable organic substances include urea and urea derivatives, glycerols, glycols, sugars (hexoses, saccharides), citric acid, lactic acid, primary alcohols, secondary alcohols, tertiary alcohols, glycol-ethers. Generally the freezing point depressant is present in the concentration of about 5 to 30 wt. % of the formulation depending upon the temperature demands dictated by the region in which the formulation is used.

The film former of the present invention comprises any suitable water soluble or water resoluble material, and preferably comprises colloidal and/or emulsion materials which are dissolved and/or dispersed in water. A group of suitable film formers for use in the present invention comprise:

- cellulosic derivatives e.g. sodium carboxy methyl cellulose, methyl cellulose, hydroxy ethyl cellulose, hydroxy propyl cellulose, hydroxy ethyl cellulose, hydroxy propyl methyl cellulose.

- polyvinyl alcohol and copolymers
- polyvinyl acetate and copolymer emulsions
- styrene - butadiene emulsions
- urea/formaldehyde and melamine/formaldehyde condensates
- polyacrylates and copolymer emulsions
- modified polysaccharides (ethylene oxide or propylene oxide)
- xanthan gums
- polyesters e.g. water soluble alkyds
- maleic anhydride modified resins and oils
- starches, starch ethers, dextrins
- alginates
- natural gums e.g. gum acacia, seaweed extracts
- caseins, zeins and derivatives.

The above materials can be used alone or in admixture

These film formers are selected to provide predictable performance and consistent properties from batch to batch which are presently not available with prior art formulations. They provide a predictable viscosity, film forming tendency, pH, and freezing point which allow them to be tailor made for particular applications which address the severity of weather conditions and type of road surface being treated. The organic film formers also act to depress the freezing point although they are not as efficient as inorganic salts.

A freezing point depressant melts the ice and snow keeping the resulting ice/snow/deicer/water layer liquid down to predetermined lower temperature limits, aids in clearing the road surface and provides for improved road safety conditions. The film former immobilizes the freezing point depressant onto the road surface thus preventing run-off. It is itself a freezing point depressant and so further improves the efficiency of ice melting and aids in the reduction of metal corrosion up to an acceptable level not attainable with present deicing formulations.

Table 1 below illustrates a typical operating range of formulations falling within the present invention along with typical pH and viscosity values.

Table 1	
	% by weight
Colloid/emulsion (solids)	3 to 30
Salt and/or freezing point depressant	5 to 30
Water	40 to 80
pH	5 to 9
Viscosity	0.1 to 3 poises at 25°C (77°F)

An optional additive which may be used with the composition of the present invention includes a non-ionic and/or anionic surfactant in a concentration of about 0.2 to 2.0 wt %. The non-ionic surfactant should have a hydrophilic lipophilic balance (HLB) value of about 2 to 10. The surfactant functions to reduce the surface tension which enables penetration of the formulation into the snow/ice matrix and promotes wetting of the road surface under the snow/ice layer. Any surfactant which can accomplish the above objectives may be used. Suitable surfactants include:

The non-ionic surfactants typically comprise ethylene oxide condensates and include polyoxyethylene alcohols, phenols, acids and esters. Many products are available under the following designations:

Trade Names	Source
Plurafac, Pluronic, Chemal	B.A.S.F.
Ethonic	Ethyl Corp.
Igepal	GAF Corp.
Merpol	DuPont
Chemax, Ethofat	Akzo
Macol	PPG/Mazer

Anionic surfactants are usually sodium salts of various organic sulfonates and sulfates such as Na salts of alkyl aryl sulfonates, alkyl naphthalene sulfonate,

di-octyl sulfosuccinate, lauryl sulfate, saturated hydrocarbon sulfonate, dodecyl sulfonate, etc.

Many products are available under the following designations:

Trade Names	Source
Alkanol, Perrowet, Duponol	DuPont
Nekal, Igepon	GAF Chemicals
Karawet	Colloids Inc.
Stepanol	Stepan Co.
Astrowet	Alco Chem. Co.

The eutectic freezing point for a water solution containing three typical salts which can be used as the freezing point depressant are as listed in Table 2 below.

Table 2		
Salt	% Concentration	Freezing Point Temperature °F
NaCl	23	- 6
$MgCl_2$	21.6	- 27
$CaCl_2$	29.5	- 60

As can be seen from the above, $CaCl_2$ will allow melting down to - 60°F but requires a high concentration to achieve this temperature. $MgCl_2$ will allow melting down to - 27°F with a lower concentration of 21.6%. Therefore, the selection of a particular salt will depend to a large extent upon the contemplated winter temperature range of use for a given geographical region.

Table 3 below dramatically illustrates the wide variance in freezing points for the concentration range of $MgCl_2$ from 0 to 30%. As can be seen from the table, concentrations over 22% do not result in a lowering of the freezing point. Other salts e.g., $CaCl_2$, act in the same way.

Table 3		
% by Weight of $MgCl_2$	Specific Gravity	Freezing Point °F
0	1.000	+32
5	1.013	+26.4
10	1.086	+17.9
15	1.132	+4.0
20	1.180	-17.2
21	1.190	-23.0
22	1.200	-27.0
23	1.210	-20.0
24	1.220	-14
25	1.230	-10
26	1.241	-6
27	1.251	-3
28	1.262	-1
30	1.283	+3

Certain chlorides such as NaCl cause an undesirable spalling of concrete where repeated freezing/thawing occurs. Another harmful effect of salts is the corrosion of steel reinforcing rods imbedded in the concrete which results in severe shear cracking eventually resulting in localized failure in road surfaces, bridge decks, parking lot and garage surfaces.

Other additives may optionally be used with the formulation of the present invention. These additives include without limitation, corrosion inhibitors; coloring agents which aid road crews in determining where they have sprayed and antifoaming compounds should foaming be a problem.

After selecting the desired film forming material for a given application, there are two additional variables to consider. One is the temperature range of use

under consideration, and the second is the type of freezing depressant used. Formulations of the present invention may be tailored for specific temperature ranges such as: .

20°F to 32°F
10°F to 20°F
0°F to 10°F
- 10°F to 0°F

Some applications dictate the use of NaCl, some $CaCl_2$, and some $MgCl_2$ and in some cases calcium magnesium acetate. For example, corrosion can be controlled by reducing or eliminating the chloride ion concentration, and replacing it with a non chloride depressant such as calcium magnesium acetate.

The present invention provides for deicing formulations which effectively melt snow and ice and which reduce corrosion and provide consistent performance specifications from batch to batch.

While the present invention has been particularly shown and described with reference to the preferred mode as illustrated in the drawing, it will be understood by one skilled in the art that various changes in detail may be effected therein without departing from the spirit and scope of the invention as defined by the claims.

CLAIMS:

1. A de-icing composition which comprises an aqueous solution which contains a film forming agent and a freezing point depressant.

2. The composition of claim 1. is in which film forming agent comprises a material selected from the group consisting of colloids, emulsions and mixtures thereof.

3. The composition of claim 2 in which the freezing point depressant comprises a salt.

4. The composition of claim 2 in which the freezing point depressant comprises a material selected from a group consisting of chlorides and acetates.

5. The composition of claim 2 in which the freezing point depressant comprises a material selected from the group consisting of urea, urea derivatives, , glycerols, glycols, sugars, citric acid, lactic acid, primary alcohols, secondary alcohols, tertiary alcohols, glycolethers and mixtures thereof.

6. A de-icing composition comprising an aqueous solution which contain a film forming agent in the form of a colloid or emulsion or mixtures thereof, and a freezing point depressant in the form of a salt in which the constituents are present in the following concentration:

	Weight %
Colloid/Emulsion	3 to 30
Salt	5 to 30
Water	40 to 80

7. A de-icing composition which comprises an aqueous solution which contains a film forming agent and a freezing point depressant in which the film forming agent

comprises a material selected from the group consisting of colloids, emulsions and mixtures thereof, and where the freezing point depressant comprises a salt.

8. The composition of claim 7 in which the freezing point depressant comprises a material selected from a group consisting of chlorides and acetates.

9. The composition of claim 7 in which the freezing point depressant comprises a material selected from the group consisting of urea, urea derivatives, glycerols, glycols, sugars, citric acid, lactic acid, primary alcohols, secondary alcohols, tertiary alcohols, glycolethers and mixtures thereof.

10. A de-icing composition comprising an aqueous solution which contain a film forming agent in the form of a colloid or emulsion or mixtures thereof, and a freezing point depressant selected from the group consisting of chlorides and acetates in which the constituents are present in the following concentration:

	Weight %
Colloid/Emulsion	3 to 30
Freezing Point Depressant	5 to 30
Water	Balance

11. The composition of claim 10 in which the film forming agent is at least one material selected from the group consisting of:

- cellulose derivatives;
- polyvinyl alcohol and copolymers;
- polyvinyl acetate and polymer emulsions;
- styrene- butadiene emulsions;
- urea/formaldehyde and melamine/formaldehyde condensates;
- polyacrylates and copolymer emulsions;
- modified polysaccharides (ethylene oxide or proylene oxide);
- xanthan gums;
- polyesters e.g. water soluble alkyds;
- maleic anhydride modified resins and oils;
- starches, starch ethers, dextrins;

- alginates;
- natural gums e.g. gum acacia, seaweed extracts; and
- caseins, zeins and derivatives.

12. A de-icing composition which comprises an aqueous solution which contains a film forming agent and a freezing point depressant in which the film forming agent comprises a material selected from the group consisting of colloids, emulsions and mixtures thereof, and where the freezing point depressant comprises a salt, said composition having a viscosity in the range of about 0.1 to 3 poises at 25°C.

13. The composition of claim 12 which further includes a non-ionic and/or anionic surfactant in a concentration of about 0.2 to 2.0 wt. %.

14. The composition of claim 12 in which the freezing point depressant comprises a material selected from the group consisting of urea, urea derivatives, glycerols, glycols, sugars, citric acid, lactic acid, primary alcohols, secondary alcohols, tertiary alcohols, glycolethers and mixtures thereof.

15. A de-icing composition comprising an aqueous solution which contain a film forming agent in the form of a colloid or emulsion or mixtures thereof, a surfactant and a freezing point depressant selected from the group consisting of chlorides and acetates in which the constituents are present in the following concentration:

	Weight %
Colloid/Emulsion	3 to 30
Freezing Point Depressant	5 to 30
Surfactant	0.2 to 2
Water	Balance

16. A de-icing composition comprising an aqueous solution which contain a film forming agent in the form of a colloid or emulsion or mixtures thereof, and a freezing point depressant selected from the group consisting of chlorides and

acetates in which the concentration of the constituents and properties are as follows:

Component	Weight %
Colloid/Emulsion	3 to 30
Freezing Point Depressant	5 to 30
Water	Balance

Property	
Viscosity	0.1 to 3 poises (at 25°C)
pH	5 - 9

17. A method for inhibiting the accumulation of freezing precipitation on a surface which comprises applying an aqueous solution which contains a film forming agent and a freezing point depressant to said surface, wherein said solution has a viscosity of about 0.1 to 3 poises at 25°C.

18. The method of claim 17 in which the film forming agent contains a colloid or an emulsion and mixtures thereof.

19. The method of claim 18 in which the freezing point depressant includes a salt.

20. The method of claim 17 in which the surface comprises a roadway, parking garage or parking lot.

21. A method for inhibiting the accumulation of freezing precipitation on a surface which comprises applying to said surface an aqueous solution which contains a film forming agent selected from the group consisting of a colloid or an emulsion and mixtures thereof, a surfactant and a freezing point depressant.

22. The method of claim 21 in which the freezing point depressant comprises a salt.

23. The method of claim 21 in which the surface comprises a roadway, parking garage or parking lot.

Abstract:

A de-icing composition in the form of an aqueous solution which contains a film forming agent and a freezing point depressant. The film forming agent comprises a material selected from the group consisting of colloids, emulsions and mixtures thereof, and the freezing point depressant includes a suitable inorganic or organic material.

01-08-01

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Practitioner's Docket No. 781_002CIP

PATENT

01/05/01

NEW APPLICATION TRANSMITTAL

[redacted]

Box Patent Application
Assistant Commissioner for Patents
Washington D.C. 20231

Transmitted herewith for filing is the patent application of:

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For: DEICING SOLUTION

1. **Type of Application**

This is a request for filing a CONTINUATION-IN-PART APPLICATION under 37 C.F.R. §1.53(b), of pending prior application:

Serial No.:	09/224,906,	Prior Art Unit:	1755
Filed:	January 4, 1999,	Prior Examiner:	Green, A.
Title:	DEICING SOLUTION		
Inventors:	Robert A. Hartley and David H. Wood		

2. **Papers Enclosed**

A. **Required for filing date under 37 CFR 1.53(b) (Regular) are:**

15 Page(s) of Specification
4 Page(s) of Claims
1 Page(s) of Abstract
___ Sheets of Formal Drawings

B. **Other Papers Enclosed**

[ ] A Preliminary Amendment
[x] A combined Declaration and Power of Attorney
[x] Information Disclosure Statement
[x] Form PTO-1449
[x] An Assignment Transmittal and Assignment of the invention to Sears Petroleum & Transport Corp.

A

PATENT APPLICATION SERIAL NO. ____________________

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

[illegible]/2001 WABRHAM1 [illegible] [illegible]

01 FC:201 [illegible]
~~02 FC:102 [illegible]~~

02/14/2001 AIBRAHIM 00000003 03755587

01 FC:202 80.00 OP

Adjustment date: 02/14/2001 AIBRAHIM
01/10/2001 WABRHAM1 00000016 03755587
02 FC:102 -80.00 OP

PTO-1556
(5/87)

*U.S. GPO: 1999-459-082/19144

DEICING SOLUTION

Background of the Invention

The current state of the art for coping with snow and ice on roads usually involves applying a deicer material such as a salt to the road surface. Sometimes antiskid materials such as sand or other aggregates such as gravel are added with or without a salt.

The use of salt and compositions having high concentrations of salt, cause an undesirable corrosive effect on vehicles, the road surface, and the environment with respect to the run off of water containing salt which contaminates the surrounding land and water.

Considering the above problems associated with salt formulations, there has been a continuing need for a deicing composition or formulation which can effectively melt snow and ice yet which reduces the corrosion and environmental contamination referred to above. In response to the above problems associated with the use of road salt, the prior art has looked to alternative formulations which are less corrosive and more environmentally friendly.

U.S. Patent 5,635,101 (Janke et al.) relates to a deicing composition containing a by-product of a wet milling process of shelled corn. Corn kernels are steeped or soaked in a hot solution containing small amounts of sulfurous acid. The corn kernels are separated from the steep water and steep water solubles are used in the production of a deicing composition.

U.S. Patent 4,676,918 (Toth et al.) relates to a deicing composition which comprises a mixture containing at least one component selected from a number of chlorides or urea and an admixture of waste concentrate of alcohol distilling that has a dry substance content of from 200 to 750 g/kg and from 10% to 80% by weight of water.

U.S. Patent 6,080,330 (Bloomer) teaches a composition for use in preventing the formation of ice or snow on outdoor surfaces, such as roadways or aggregate stockpiles, and also for deicing surfaces upon which snow or ice has formed. The composition is formed from a waste product of the process of removing sugar from sugar beet molasses, also known as desugared sugar beet molasses.

The Janke et al., Toth et al. and Bloomer materials are naturally occurring substances with hundreds (if not thousands) of components such as complex carbohydrates, starches, sugars, proteins etc. and are normally used with a salt.

The above de-icing solutions now being introduced in the field employ agricultural residues e.g., corn based distillers solubles and solubles from the corn wet milling industries. These naturally occurring substances, which also include brewers condensed solubles, are extremely variable in composition, viscosity, film forming tendency, freezing temperature, pH etc., and consequently give varying performance when used in de-icing solutions. Depending upon the source and batch, these materials at low temperatures sometimes exhibit such resistance to flow that they cannot be applied evenly to a road surface or mixed with a chloride, rendering them virtually unsuitable for use.

Furthermore, these patents utilize materials which have highly undesirable or unnecessary ingredients leading to practical difficulties by manufacturers and users, such as stratification in storage, biological degradation, odor, plugging of filters and spray nozzles and environmental difficulties e.g. high biological oxygen demand due to the very high organic contents (about 40% by weight), presence of phosphorus compounds and heavy metals.

To improve quality and performance, and to meet current mandated standards, there is an immediate need for synthetic, chemically modified thickeners, and carefully purified materials which can be substituted for the currently used agricultural residues. Such a formulation would improve performance and reduce metal corrosion, spalling of concrete, toxicity and addresses environmental concerns.

It is therefore an object of the present invention to provide a deicing formulation which exhibits improved performance standards which overcomes the prior art problems described above.

It is a further object of the present invention to provide a deicing formulation which utilizes a synergistic combination of a low molecular weight carbohydrate and an inorganic freezing point depressant.

It is another object of the present invention to provide a deicing formulation which utilizes a low molecular weight carbohydrate to provide for improved ice melting properties and exhibits less corrosion.

It is a further object of the present invention to provide a deicing formulation which provides consistent physical and chemical properties, thereby assuring consistent quality and performance.

It is another object of the present invention to provide an economical, highly effective deicing formulation.

Summary of the Invention

The present invention is based upon the discovery that low molecular weight (about 180 to 1,000) carbohydrates when used with an inorganic freezing point depressant such as a chloride salt has a synergistic effect upon freezing point depression. The formulation of deicing/anti-icing compositions employs carbohydrates of less than about 1,000 molecular weight, such as glucose/fructose, disaccharides, trisaccharides, tetrasaccharides, pentasaccharides, hexasaccharides, and mixtures thereof. The broader operative range for the carbohydrate molecular weight is from about 180 to 1,500, with the range of about 180 to 1,000 being preferred.

The basic composition of the present invention consists of at least the first two of the following three components in aqueous solution depending upon ambient weather conditions, terrain, nature and amount of freezing/snow precipitation, and environmental concerns:

(1) Inorganic freezing point depressants preferably in the form of chloride salts which include magnesium chloride, calcium chloride and sodium chloride. Metal acetates e.g. calcium magnesium acetate, may also be used.

(2) Low molecular weight carbohydrates in the 180 to 1,500 range (180-1,000 preferred). These carbohydrates can be obtained from a wide range of agricultural based products such as those derived from corn, wheat, barley, oats, sugar cane, sugar beets etc.

(3) Thickeners are used in certain applications as the third key component to increase the viscosity of the composition so that the liquid remains in contact with the road surface or with the solid particles in piles of rocksalt/sand, or rocksalt/aggregates, or salt alone, or sand or aggregate. Thickeners are mainly cellulose derivatives or high molecular weight carbohydrates. Typical molecular weights for cellulose derivatives are for methyl and hydroxy propyl methyl celluloses from about 60,000 to 120,000 and for hydroxy ethyl celluloses from about 750,000 to 1,000,000. Carbohydrate molecular weights range from about 10,000 to 50,000.

These components are used in an aqueous solution in the following concentrations:

	Weight %
Carbohydrate	3 to 60
Inorganic Freezing Point Depressant	5 to 35
Thickener	0.15 to 10

The above described compositions provide a de-icing and anti-icing formulation which can be formulated more uniformly to provide for more consistent properties from batch to batch, while at the same time providing for increased ice melting properties.

Detailed Description of the Invention

In the development of the present invention it was determined that the predominant organic constituents in the prior art formulations described above were carbohydrates, and in one series of tests, Brewers Condensed Solubles (BCS), which was selected as a test sample, was diluted with water and separated into several fractions by the addition of increasing amounts of an ethanol/methanol 85/15 v/v mix. The characteristic of the various fractions and their freezing points when mixed with 15% magnesium chloride are tabulated below.

T,0010

TABLE 1

Sample	% ethanol/ methanol added	% Solids	% Carbohydrates	Freezing Point °F	Freezing Point °C
Brewers (BCS)	NIL	43.6	43.1	-31.9	-35.5
Fraction A Precipitate	60	5.3	3.8	-10.1	-23.4
Fraction B Precipitate	74	3.7	3.2	-10.8	-23.8
Fraction C Precipitate	82	2.8	2.1	-10.3	-23.5
Fraction D Precipitate	85	1.3	0.6	-9.9	-23.3
Fraction E Solubles	85	30.7	29.8	-22.7	-30.4

Fraction A consisted of essentially insoluble, high molecular weight polysaccharides, whereas Fractions B to D inclusive gave gummy residues of polysaccharides. Fractions A to D had little effect upon freezing point depression. Fraction E, the largest component, had a considerable effect upon freezing point and is a mixture of lower molecular weight polysaccharides.

Fraction E was also examined for ice melting characteristics at 25°F (-4°C) in admixture with magnesium chloride employing SHRP H-205.2 Test Method for Ice Melting of Liquid Deicing Chemicals.

TABLE 2

T,0001

Deicing Solution	Lbs weight ice melted per lb weight of inorganic salt
15% magnesium chloride, control	16.9
Brewers BCS/Mg Cl_2	18.2
Fraction E/ Mg Cl_2	19.3
32% calcium chloride	7.3
26.3% sodium chloride	7.5

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The last two figures were calculated from data in SHRP H-205.2. These results indicate the appreciable improvement over the commonly used sodium and calcium chlorides in ice melting characteristics when Fraction E and Brewers BCS are mixed with magnesium chloride. There is also a 14% improvement over the control when Fraction E is used. This, together with freezing point depression improvement indicates that an appreciably improved deicing solution can be formulated.

The next stage of the investigation consisted of attempting to isolate and define the active components in the Brewers BCS. This was done by first filtering employing a 0.45 micron membrane followed by ultrafiltration using a Model UFP-1-E-s (A/G Technology Corporation, Needham, MA) with a nominal cutoff at a molecular weight of 1000 and finally gel permeation chromatography (GPC) using a Waters LC Module 1 unit with a set of three ultrahydrogel columns and 50 mm Na_2HPO_4 solution at pH7 as the mobile phase. The brewers BCS liquor had two major carbohydrate fractions (a) a low molecular weight fraction with the majority of components having a molecular weight of less than 1000, and (b) a high molecular weight fraction containing compounds with a molecular weight of 12,600 but with some components in the 1000 to 10,000 molecular weight range. Fraction E was found to have a chromatographic profile very similar to the low molecular weight fraction (a) above with a molecular weight of less than 1000. Cane Sugar DCS liquor had more components than the Brewers BCS but had similar high and low molecular weight fractions with similar molecular weight distributions.

In order to confirm that the low molecular weight fraction has the greatest effect upon freezing point depression, a further series of freezing points were measured using in this instance, Dead Sea Salt Solution from Jordan in lieu of laboratory grade magnesium chloride. Again the concentration of magnesium chloride was 15% by weight for all samples.

TABLE 3

Sample	Freezing Point °F	°C
Control: Industrial grade magnesium chloride solution/Water	-0.4	-18.0
Brewers(BCS)	-31.9	-35.5
Brewers GPC High Mol Wt Fraction	-5.1	-20.6
Brewers GPC Low Mol Wt Fraction	-16.4	-26.9
Brewers BCS Fraction E	-13.4	-25.2

It was thus shown that low molecular weight (less than 1000) carbohydrates had the greatest effect upon freezing point depression. Based upon these experiments, it was concluded that the formulation of deicing/anti-icing compositions should employ compounds in the less than 1000 molecular weight range such as those tabulated below in Table 4:

TABLE 4

Carbohydrate	Molecular Weight
Glucose/fructose	180
Disaccharides	342
Trisaccharides	504
Tetrasaccharides	666
Centasaccharides	828
Hexasaccharides	990

There is available commercially a wide range of carbohydrates with varying carbohydrate compositions. An evaluation was conducted using simple sugars, disaccharides and polysaccharides in an attempt to determine the effect of molecular weight and solute concentration upon freezing point. The concentration of

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magnesium chloride used in the test was 15% by weight. The test results for simple carbohydrates and complex carbohydrates are tabulated below in Tables 5 and 6 respectively.

TABLE 5 SIMPLE CARBOHYDRATES

Carbohydrate		% Concentration of Carbohydrate	Freezing Point	
Type	Name		°F	°C
– Control	$MgCl_2$ (15%)	Nil	-4.7	-20.4
Sugar	Fructose	25.0	-8.9	-22.7
Sugar	Fructose	50.0	-18.2	-27.9
Sugar	Fructose	75.0	-31.9	-35.5
Sugar	Glucose	30.0	-11.4	-24.1
Sugar	Glucose	65.0	-37.3	-38.5
Disaccharide	Maltose	25.0	-8.3	-22.4
Disaccharide	Lactose	25.0	-11.7	-24.3

TABLE 6 COMPLEX CARBOHYDRATES

Carbohydrate	% Concentration of Carbohydrate	Freezing Point		Comments
		°F	°C	
Control $MgCl_2$ (15%)	Nil	-4.7	-20.4	
Corn syrup-high maltose	30	-5.6	-20.9	Contains glucose, maltose and maltotrisoe
Corn syrup-high maltose	65	-19.1	-28.4	
Corn syrup solids DE20	25.0	-9.9	-23.3	Average Mol. Wt. 3746

Corn syrup solids DE44	25.0	-11.6	-24.2	Average Mol. Wt. 1120
Corn syrup solids DE44	50.0	-21.3	-29.6	
Corn syrup solids DE44	65.0	-27.0	-32.8	

It can be seen from the results above that glucose is better than fructose and of the two dissacharides lactose is somewhat better than maltose. The corn syrup DE20 has about 47% of mono to hexasaccharides and the DE44 grade has about 69%, and the latter grade is slightly better in reducing freezing point. Also Table 6 shows that there is a relationship between carbohydrate concentration and freezing point thus allowing various formulations to be developed.

More complex carbohydrates were also evaluated such as dextrins and maltodextrins which are derived by hydrolysis (enzymatic or via dilute mineral acids) of corn starch. In addition a series of thickeners were evaluated. The control magnesium chloride solution was prepared from the hexahydrate in Table 7 below which shows the results obtained. Again all samples contained 15% by weight of magnesium chloride.

TABLE 7

Compound	% Concentration	Freezing Point °F	Freezing Point °C	Comment
Control 15% Mg Cl_2	Nil	+3.4	-15.9	
Dextrin	5.0	-4.7	-20.4	
Maltodextrin DE5	5.0	-4.7	-20.4	
Maltodextrin DE15	9.1	-17.1	-27.3	Lower Mol. Wt than DE 5
Hydroxyethyl cellulose 250 HHR	0.33	+1.2	-17.1	Thickener
Carboxymethyl cellulose	1.0	+2.5	-16.4	Thickener

Gum arabic	3.6	-1.8	-18.8	Thickener
Gum tragacanth 470	0.2	-3.3	-19.6	Thickener

The Maltodextrin DE15 exhibits good results due to the lower molecular weight components present and the higher concentration. The higher the molecular weight, the less the influence upon freezing point. Some thickeners were unstable in the presence of magnesium chloride e.g. carboxy methyl cellulose, and so lose their efficacy as thickeners.

It is also important to define the chloride salt content for deicing/anti-icing liquids, the higher the chloride salt content, the lower the freezing point and the higher the ice melting characteristics. These characteristics are shown by the data in Table 8 below for Mg Cl_2 and Ca Cl_2 at varying salt and carbohydrate concentrations.

TABLE 8

Chloride Salt	% salt by weight	% Carbohydrate by weight	Freezing Point °F	Freezing Point °C
Mg Cl_2	22.7	18.0	Less than -47	Less than -43.9
Mg Cl_2	15.0	25.5	-22	-30
Ca Cl_2	29.6	18.6	Less than -47	Less than -43.9
Ca Cl_2	17.5	4.1	-5.4	-20.8
Ca Cl_2	15.0	4.1	-0.6	-18.1

As the concentrations of salts and carbohydrates increase the freezing point of the mixtures decrease. In the case of calcium chloride at a fixed carbohydrate concentration of 4.1% an increase of 2.5% by weight of Ca Cl_2 decreased the freezing point by 4.8°F (2.67°C). Again formulations can be varied to suit local conditions. Care must be taken as salt concentrations approach the eutectic point on

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the freezing point-- concentration curve where the freezing point can rise and the salt can crystallize out.

From the above discussion and laboratory evaluations the basic composition consists of at least the first two of the following components in aqueous solution depending upon ambient weather conditions, terrain, nature and amount of freezing/snow precipitation, environmental concerns, etc:

(1) An inorganic freezing point depressant in the form of inorganic electrolytes, mainly chlorides, but also others, such as sulfates and acetates, and could be used in concentrations of about 5 to 35 wt%. The main types employed are magnesium chloride, calcium chloride and sodium chloride.

(2) A carbohydrate, especially lower molecular weight carbohydrates in a range of about 180 to 1500. A preferred range is about 180 to 1,000. The carbohydrates can be obtained primarily from a wide range of agricultural based products such as those derived from corn, wheat, barley, oats, sugar cane, sugar beet, etc.

(3) Thickeners which are used in a concentration of about 0.15 to 10 wt% to increase the viscosity of the compositions so that the liquid remains in contact with the road surface or with the solid particles in piles of rock salt/sand, or rock salt/aggregates, or rock salt alone, or sand or aggregate. Thickeners are mainly cellulose derivatives such as methyl cellulose, hydroxy ethyl cellulose, hydroxy propyl methyl cellulose, hydroxy propyl cellulose, etc. or high molecular weight carbohydrates.

The corrosivity of deicing/anti-icing liquids is important due to the effect upon automobiles, other road transport vehicles, bridges, reinforcing rods (rebars) in concrete structures such as bridge decks, ramps and parking garage decks.

The testing of liquids for corrosivity can be quite complex and there are a number of tests developed by organizations such as ASTM and the National Association of Corrosion Engineers (NACE). The test conditions and metals must approximate those experienced in practice such as aerobic conditions and cold rolled steel specimens. Prior art tests using nails immersed in liquid contained in a screw

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top bottle are not meaningful mainly because of the anaerobic conditions and the variation in metal substrate composition, the degree of cold working and cleanliness.

Satisfactory test methods include SHRP H205.7 Test Method for Evaluation of Corrosive Effects of Deicing Chemicals or Metals (Handbook of Test Methods for Evaluating Chemical deicers SHRP-H332, Strategic Highway Research Program, National Research Council, Washington, D.C.) And the test described in the Deicer Specifications for the Pacific Northwest States of Idaho, Montana, Oregon, Washington. The latter is based upon the NACE Standard test Method for the Laboratory Corrosion Testing of Metals. TM0169-95.

Some corrosion rate results employing SHRP H205.7 showing corrosion inhibition due to carbohydrate presence are tabulated below in Table 9.

TABLE 9

% Chloride Salt	% Carbohydrate	Corrosion Rate (mils per year)		
		One Week	Three weeks	Six weeks
15% Na Cl	Nil	5.97	4.66	5.48
15% Mg Cl_2	Nil	2.58	1.93	1.73
15% Mg Cl_2	4.1	0.89	0.61	0.40

As can be seen from the data in Table 9, the carbohydrate magnesium chloride formulation reduces the corrosion rate of steel by 92.7% as compared to sodium chloride alone and 76.9% as compared to magnesium chloride alone. Formulations as shown in Examples III and IV (q.v.) were tested for corrosivity employing the Pacific Northwest States protocol and there was a reduction in the corrosion rate compared to sodium chloride solution of 57.2% for Example III and 40.4% for Example IV. This again shows corrosion inhibition properties.

The following examples are exemplary of various specific embodiments of the present invention which are useful as deicing agents:

T0140

Example I

Component	Part by Weight
Corn Syrup Solid DE 44	22.5
Industrial grade magnesium chloride solution*	50.0
2% Methocel Solution	2.0
Colorant (Caramel YT25)	0.5
Water	25.0
Freezing Point (ASTM-D 1177-94)	-12.5°F/-24.7°C
Viscosity at 77°:	20 centipoise
Appearance:	Gold color, clear solution
Odor:	Mild, pleasant

*Note: Industrial grade magnesium chloride solution is a commercially available magnesium chloride solution also containing calcium chloride, sodium chloride, potassium chloride.

T0141

Example II

Component	Parts by Weight
High maltose corn syrup	31.5
Industrial grade magnesium chloride solution	50.0
Colorant (Caramel YT25)	0.5
Water	18.0
Freezing Point (ASTM-D 1177-94):	-22°F/-30°C
Viscosity at 77°F	14.4 centipoises
Appearance	Gold color, clear solution
Odor	Mild, pleasant

T0142

Example III

Components	Parts by Weight
High Maltose Corn Syrup	22.2
Industrial grade magnesium chloride solution	70.0
Water	7.8
Freezing point (ASTM-D 1177-94)	Less than -47°F/-43.9°C

Appearance	Clear, light brown, mobile liquid
Odor	Mild, pleasant
Specific gravity	1.27
Viscosity at -94°F/-70°C	Heavy syrup, flows

Example IV

Component	Parts by Weight
High Maltose Corn Syrup	20.5
43% $CaCl_2$	72.3
Water	7.2
Freezing Point (ASTM- D 1177-94)	Less than -47°F/-43.9°C
Appearance	Clear, colorless, mobile liquid
Odor	Mild, pleasant
Specific Gravity	1.33
Viscosity at -47°F/-43.9°C	Very heavy syrup

Example V

Component	Parts by Weight
High Fructose Corn Syrup	19.55
43% Calcium Chloride Solution	73.15
Water	7.30
Freezing Point (ASTM- D 1177-94)	-31°F/-35°C
Appearance	Clear, colorless, mobile liquid
Specific Gravity	1.38
Odor	Mild, pleasant

Example VI

Component	Parts by Weight
Glucose	32.5
Industrial grade magnesium chloride solution	50.0
2% Methocel Solution	2.0
Colorant (Caramel YT25)	0.5
Water	15.0
Freezing Point (ASTM- D 1177-94)	-38.2°F/-39.0°C

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Appearance	Gold color, clear solution
Odor	Mild, pleasant

Colorants may also be used to enable applicators to see where the deicer has been deposited. Non-toxic colorants which may be used include caramel solutions and food grade dyes.

While the present invention has been particularly shown and described herein with reference to various preferred modes it will be understood by one skilled in the art that various changes in detail may be effected therein without departing from the spirit and scope of the invention as defined by the claims.

We Claim:

1. A de-icing and anti-icing composition comprising an aqueous solution which contains a low molecular weight carbohydrate and a chloride salt in which the constituents are present in the following concentration:

	Weight %
Carbohydrate	3 to 60
Inorganic Freezing Point Depressant	5 to 35
Water	Balance

and where said carbohydrate has a molecular weight in the range of about 180 to 1500.

2. The composition of claim 1 in which the inorganic freezing point depressant is a chloride salt.

~~3.~~ 2. The composition of claim 1 in which the chloride salt is at least one selected from the group consisting of sodium chloride, magnesium chloride and calcium chloride. A&b 5/01

~~4.~~ 3. The composition of claim 1 which further includes a colorant to provide visual aid in applying the composition to a surface.

5. A de-icing and anti-icing composition comprising an aqueous solution which contains a low molecular weight carbohydrate, an inorganic freezing point depressant, and a thickener in which the constituents are present in the following concentration:

	Weight %
Carbohydrate	3 to 60
Inorganic Freezing Point Depressant	5 to 35
Thickener	0.15 to 10

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Water	Balance

and where said carbohydrate has a molecular weight of about 180 to 1,500, with said composition having a viscosity in the range of about 0.1 to 3 poises at 25°C.

Sub B2

6. The composition of claim 5 in which the inorganic freezing point depressant is a chloride salt.

5 ~~7~~. The composition of claim ~~5~~ 4 in which the chloride salt is at least one selected from the group consisting of sodium chloride, magnesium chloride and calcium chloride.

6 ~~8~~. The composition of claim ~~5~~ 4 which further includes a colorant to provide visual aid in applying the composition to a surface.

9. The composition of claim 5 in which the thickener is selected from the group consisting of high molecular weight cellulose derivatives and carbohydrates in the range of about 60,000 to 1,000,000 for cellulose derivatives and 10,000 to 50,000 for carbohydrates.

10. A de-icing composition comprising an aqueous solution which contains a carbohydrate, a thickener which functions to control or modify viscosity, and an inorganic freezing point depressant in which the constituents are present in the following concentration:

	Weight %
Carbohydrate	5 to 60
Thickener	0.15 to 10
Inorganic Freezing Point Depressant	5 to 35
Water	Balance

and where said carbohydrate has a molecular weight in the range of about 180 to 1500 and, where said thickener is selected from the group consisting of cellulosic derivatives, polysaccharides and mixtures thereof, and where said inorganic freezing point depressant is selected from the group consisting of chloride salts, and mixtures thereof, with said composition having a viscosity in the range of about 0.1 to 3 poises at 25°C.

11. The composition of claim 10 in which the carbohydrate is selected from the group consisting of: glucose, fructose, disaccharides, trisaccharides, tetrasaccharides, pentasaccharides, contasaccharides, hexasaccharides, and mixtures thereof.

12. The composition of claim 10 which further includes a colorant to provide visual aid in applying the composition to a surface.

13. A de-icing and anti-icing composition comprising an aqueous solution which contains a low molecular weight carbohydrate and a chloride salt in which the constituents are present in the following concentration:

	Weight %
Carbohydrate	3 to 60
Inorganic Freezing Point Depressant	5 to 35
Water	Balance

and where said carbohydrate has a molecular weight in the range of about 180 to 1000.

14. A de-icing and anti-icing composition comprising an aqueous solution which contains a low molecular weight carbohydrate, an inorganic freezing

point depressant, and a thickener in which the constituents are present in the following concentration:

	Weight %
Carbohydrate	3 to 60
Inorganic Freezing Point Depressant	5 to 35
Thickener	0.15 to 10
Water	Balance

and where said carbohydrate has a molecular weight of about 180 to 1,000 with said composition having a viscosity in the range of about 0.1 to 3 poises at 25°C.

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Abstract:

A de-icing and anti-icing composition in the form of an aqueous solution which includes a low molecular weight carbohydrate, a inorganic freezing point depressant in the form of a chloride salt, and a thickener. The molecular weight of the carbohydrate is from about 180 to 500, with a preferred range of about 180 to 1000.

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Docket No.
781_002CIP

Declaration and Power of Attorney for Patent Application
English Language Declaration

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

DEICING SOLUTION

the specification of which

(check one)

☒ is attached hereto.

☐ was filed on as United States Application No. or PCT International Application Number ______ and was amended on ______.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International Application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International Application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

			Priority Not Claimed
(Number)	(Country)	(Day/Month/Year Filed)	☐
(Number)	(Country)	(Day/Month/Year Filed)	☐
(Number)	(Country)	(Day/Month/Year Filed)	☐

I hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States Provisional Application(s) listed below:

60/070,636	January 7, 1998
(Application Serial No.)	(Filing Date)
(Application Serial No.)	(Filing Date)
(Application Serial No.)	(Filing Date)

I hereby claim the benefit under 35 U.S.C. Section 120 of any United States Application(s), or Section 365(c) of any PCT International Application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International Application in the manner provided by the first paragraph of 35 U.S.C. Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C.F.R. Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

09/224,906	January 4, 1999	Pending
(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)
(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)
(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (*List names and Registration Number*)

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UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF NEW YORK

CARGILL, INCORPORATED, Plaintiff and Counterclaim Defendant, v. SEARS PETROLEUM & TRANSPORT CORP., and SEARS ECOLOGICAL APPLICATIONS CO., LLC, Defendant and Counterclaimants.	Civil Action No.: 03 CIV 530 (DEP) The Hon. David E. Peebles

EXPERT WITNESS REPORT IN REBUTTAL
BY DR. E. BRUCE NAUMAN

I have been retained by counsel for defendant/counterclaimant Sears Petroleum & Transport Corp. and additional counterclaimant Sears Ecological Applications Co., LLC (collectively, "Sears") as an expert consultant in the above-identified case. In what follows, I will refer to plaintiff/counterclaim defendant Cargill, Incorporated as "Cargill." I understand that I may be called to present expert testimony at trial, and I have been asked to prepare written reports with respect that possible testimony. The present report rebuts reports submitted by Dr. Wilfrid A. Nixon and Mr. Cameron Weiffenbach.

1. Preamble

My qualifications, compensation and prior testimony are described in two reports that I have submitted previously in this litigation:

Expert Witness Report on Infringement of Dr. E. Bruce Nauman

and

Expert Witness Report on Trade Secrets of Dr. E. Bruce Nauman.

I will refer to these as the Nauman Infringement Report and the Nauman Trade Secrets Report, respectively. In forming my opinions, I have relied on data and other information considered in my previous report plus additional information available in the open literature, as cited herein. I have also relied on:

Expert Witness Report on Snow and Ice Removal of L. David Minsk

and the various references cited therein. I will refer to this as the Minsk Report. Additionally, I have considered two reports, together with their attachments and citations, submitted on behalf of Cargill in this litigation:

Expert Report of Wilfrid A. Nixon, Ph.D., P.E.

and

Expert Report of Cameron Weiffenbach.

I will refer to these as the Nixon Report and the Weiffenbach Report, respectively. I will refer to Dr. Nixon as "Nixon" and to Mr. Weiffenbach as "Weiffenbach." Finally, I have considered other documents produced in this litigation, as cited herein.

2. Summary of Expected Testimony and Opinions

The Nixon Report raises a number of technical issues and the Weiffenbach Report raises technical and legal issues that, among other things, question the validity of the '793 patent. In my opinion, these reports contain errors of fact and judgment that I will outline in what follows. I believe that the '793 patent was neither anticipated nor obvious in light of the prior art, that the stated inventors had in fact made the invention, and that the invention was adequately enabled in

the disclosure so that a person of ordinary skill in the art could duplicate the invention and understand when it had been duplicated. I believe that the '793 patent is entitled an earlier priority date, based on its parent applications. Further, I believe that all information believed to be relevant to the prosecution of the '793 patent was disclosed to the examiner.

3. The Nixon Report

The Nixon Report discusses the prior art in Section V, proposes a definition of a person of ordinary skill in the art in Section VI, and then draws conclusions in Section VII. After his conclusions, Nixon then discusses Inventorship in Section VIII and Materiality in Section IX. I will address each section of his report in turn.

3.1 Prior Art

The Nixon Report discusses at length the fact that sugars added to water will depress the freezing point of water. This fact has indeed been well known for many years, and in my opinion, has absolutely no bearing on the validity of the '793 patent. In fact, the freezing point of <u>any solvent</u> can be lowered by the addition of <u>any solute</u>. Thus salt water, wine, and the antifreeze mixture used in cars all freeze at lower temperatures than pure water. In these examples, the solvent is water and the solutes are salt, alcohol and ethylene glycol, respectively. The FDP equation for the depression in freezing point is well known and is explained in Exhibit F to this report. (Exhibits A - E are attached to the Nauman Infringement Report.) What the FDP equation says is that the depression in freezing point is directly proportional to the number of solute particles (molecules or ions) that have been dissolved. The kind of solute particles is not important. Thus, when expressed using the particle concentration (molecules or ions of

solute per liter of solvent), all solutes behave the same. When the concentration is expressed in weight units, the behavior will be different because the particles weigh different amounts depending on their molecular weight and disassociation characteristics. Low molecular weight compounds or compounds that ionize (*e.g.* salts) are more effective because they generate more particles for a given percent by weight. When the molarity (see Exhibit F) of the solution is the same, then alcohol, acetone, glucose, fructose and sucrose all cause a similar reduction in freezing point, about 2°C per unit of molarity. (When the weight percentages are equal, they give different reductions in the freezing point due to their different molecular weights. See Exhibit F.) When the amount of solute is doubled, then the reduction in freezing point doubles. When two solutes are mixed, their combined effect is the sum of the individual effects.

The phenomena described above are consistent with results from the open literature as cited in the Nixon Report. I do not contest these results nor are they contradicted by the disclosure of the '793 patent. Knowledge of the concentration and molecular weight of dissolved substances will, under some circumstances, allow the reduction of the freezing point to be calculated. This is true not just for sugars, but for any soluble compound. However, the prior art and the corresponding laws of physics described in Exhibit F are subject to limitations. One key limitation is that the concentration of solute particles must be so low that the particles interact only with water molecules and not with each other. At higher concentrations, the equation discussed in Exhibit F no longer applies. Deviations from it may be either positive or negative. As one obvious example, the sugars and chloride salts of interest in the present limitation have limited solubility in water so that the maximum molarity and corresponding maximum reduction in freezing point are limited. Also, deviations from the simple

proportionality between molarity and freezing point depression will generally occur before the saturation limit is reached. Such deviations are important for magnesium chloride solutions where the effectiveness of the solute increases with increasing concentrations up to the solubility limit. A 15 weight percent solution of $MgCl_2$ has a reduction in freezing point of 16°C, but the value calculated using standard values for the constants in the FDP equation predicts a depression of only 10°C. See Exhibit F. As a practical matter, experiments are needed to determine freezing points of concentrated solutions of a single solute. The situation becomes much more complicated when there are multiple solutes.

Interactions between unlike solute particles as well as between like solute particles prevent any simple method for estimating the freezing point of a concentrated mixture. When the solutes are dilute, the effects of the individual components can be summed to give the overall effect, but this does not work for concentrated solutions. Instead, extensive experimentation is necessary, and there is no way in advance to predict that the experiments will give useful results.

For the case at hand, magnesium chloride has a eutectic temperature of about -33°C (Exhibit D), which means that no mixture of just magnesium chloride and water can have a freezing point less than about -33°C. The example in table 8 of the '793 patent shows that a mixture containing 21.6 weight percent magnesium chloride and 18 percent carbohydrate has a freezing point less than about -44°C, the actual temperature not being measured due to equipment limitations. As shown in Exhibit F, the carbohydrate by itself would lower the freezing temperature only by about 2°C, and thus the combination of solutes gives a result far better than the sum of their individual contributions, the sum being about 35°C. This is the

synergy between the chloride salt and the carbohydrate described in the '793 disclosure. Other examples of synergy are disclosed in table 4 of the parent, non-provisional application and in Exhibit F.

Paragraph 1 of Section V of the Nixon Report recites literature values for the freezing point depression caused by various sugars in water. These values are consistent with the above analysis and that in Exhibit F. They do not apply to mixtures of sugars with chloride salts. There is no disagreement that freezing depression is a typical experiment in undergraduate chemistry. In fact, it is one way to determine molecular weights of unknown but soluble substances. These literature references do not teach the use of a chloride salt in combination with sugars, nor the use of colorants or thickeners in deicer formulations. The cited prior art thus does not anticipate the claims of the '793 patent, nor does it make those claims obvious when read by itself or in conjunction with other prior art.

Paragraph 2 of Section V of the Nixon Report cites an article in the open literature by Murray and Luft on corn starch hydrolysates (*i.e.* corn sugars). The results in this article are consistent with the above analysis and Exhibit F. It is agreed that dissolved sugars depress the freezing point of water and that, when the weights of dissolved sugar are the same, lower molecular weight sugars depress the freezing point more that higher molecular weight sugars. The Murray and Luft reference does not teach the use of a chloride salt in combination with low molecular weight carbohydrates obtained from a substantially pure and consistent source, nor the use of colorants or thickeners in deicer formulations. The Murray and Luft paper thus does not anticipate the claims of the '793 patent, nor does it make those claims obvious when read by

itself or in conjunction with other prior art.

Paragraph 3 of Section V of the Nixon Report cites U.S. Patent 5,922,240 to Johnson. This patent was considered by the examiner during the prosecution of the '793 patent. The Johnson patent teaches the use of brewers' condensed solubles (BCS) as a component in deicer and anti-icer formulations. The '793 patent discloses the fractionation of BCS to determine component compounds that are especially effective as deicers and anti-icers. The fractionation led to the finding that low molecular weight carbohydrates are especially effective, in conjunction with chloride salts, as deicers and anti-icers. The examiner obviously knew that BCS contains low molecular weight carbohydrates (a.k.a. sugars) since this fact was revealed in the disclosure of the '793 patent (c. 4, lines 31 -34). The Johnson patent does not teach the molecular weight range for the carbohydrates and does not disclose the synergy between these carbohydrates and chloride salts. The Johnson patent uses an ill-defined, fermentation waste that lacks the substantial purity and consistency of the formulations claimed in the '793 patent. See c. 5, lines 46 - 49 of the Johnson patent. Paragraph 3 of Section V of the Nixon Report also cites an article by Sebree *et al.* to the effect that brewers' condensed solubles are known to contain appreciable amounts of low molecular weight carbohydrates. Thus Nixon concludes that "It is thus reasonable to believe that maltose and other sugars play a key role in the de-icing properties of the product taught in the Johnson patent." In my opinion, this conclusion is reasonable only with the hindsight provided by the '793 patent. At the time the Johnson patent issued, a more reasonable assumption would have been that proteins and other substances found in BCS were more important than sugars in the deicing performance of formulations based on BCS. This opinion is reinforced by, among other things, claim 2 of the Johnson patent that specifies 15 to

50 weight percent protein. No claim places limits on the carbohydrate content. In any event, as noted above, the examiner was aware of the fact that BCS contains low molecular weight mono- and oligosaccharides, which are also known as low molecular weight carbohydrates. (The literature on carbohydrate chemistry is very old and contains many synonyms. See Exhibit G.) Also, most of the claims in the Johnson patent do not involve chloride salts. Those that do involve chloride salts give no indication of amount. To the extent that the carbohydrate content can be determined from the examples in the Johnson patent that involve a chloride salt, it is below 3 weight percent. The Johnson patent does not teach the use of colorants or thickeners in deicer formulations. The Johnson patent thus does not anticipate the claims of the '793 patent, nor does it make those claims obvious when read by itself or in conjunction with the Sebree paper or with other prior art.

Paragraph 4 of Section V of the Nixon Report cites U.S. Patent 4,746,449 to Peel and claims that this patent teaches the use of sugars in deicer formulations. In my opinion, this citation is disingenuous because the Peel patent places an upper limit on the combined concentrations of sugars and lignin and seeks to minimize their content. At the time the Peel patent issued, a person of ordinary skill in the art would conclude that the patented composition benefited primarily from the presence of various salts and that the sugar and lignin content was detrimental. Claim 1 of the Peel patent reads in part:

> ...wherein said fraction further comprises lignin fractions having molecular weight of less that 500 and sugars having molecular weight of about 150 to 180, and the weight of said sugars and said lignin are less than 25% based on the total weight of salts, said step (b) thereby maximizing the production of said salts.

Also, substantial portions of the sugars in wood-derived products are 5-carbon sugars known as pentoses. Pentoses have a molecular weight of 150 and thus fall outside the ranges claimed in

the '793 patent. The efficacy of pentoses in deicer formulations has not been established. The Peel patent merely teaches that the carbohydrates in spent sulfite liquor are pentoses and hexoses. The Peel patent does not disclose any synergy between these sugars and chloride salts. Indeed, the Peel patent teaches away from the use of sodium chloride and other salts that accelerate corrosion, with a maximum 0.5 weight percent sodium chloride on a dry basis being specified in claim 5 of that patent. The Peel patent uses an ill-defined, paper processing waste that lacks the substantial purity and consistency specified for the sugar sources in the '793 patent. The Peel patent does not teach the use of colorants or thickeners in deicer formulations. The Peel patent thus does not anticipate the claims of the '793 patent, nor does it make those claims obvious when read by itself or in conjunction with other prior art.

Paragraph 5 of Section V of the Nixon Report cites U.S. Patent 4,668,416 to Neal and U.S. Patent 4,824,588 to Lin. Like the Peel patent, these patents teach the use of spent sulfite liquor in deicing formulations. Nixon misrepresents the disclosure of the Neal patent. Nixon states: "What is of interest in these two patents is that the spent sulfite liquor comprised between 20 and 25% hexose and pentose sugars, which are low molecular weight carbohydrates." In fact, the words sugar, pentose, and hexose are not found in the Neal patent, and carbohydrates are mentioned in a dismissive sense, "... with the remainder consisting of carbohydrates and other organic and inorganic compounds." The Lin patent does disclose the presence of wood sugars, and Nixon concludes: "This shows that monosaccharide sugars (*e.g.* hexose and pentose) have a significant effect as a deicing agent component." The logic of this conclusion is unclear since spent sulfite liquor contains many other compounds. A person of ordinary skill in the art would have no reason to conclude that sugars would be an effective component of a deicer formulation.

It is not clear even now if the formulations patented by Peel, Neal and Lin benefited in any appreciable way from their sugar contents. Indeed, they may have been detrimental as suggested by Peel. Neal teaches that spent sulfite liquor from which carbohydrates have been removed by fermentation can be used in deicer formulations. Note also that pentoses have molecular weights of 150 and are thus outside the range claimed in the '793 patent. These patents use an ill-defined, paper processing waste that lacks the substantial purity and consistency specified for the sugar sources in the '793 patent. These patents do not teach the use of colorants or thickeners in deicer formulations. The Neal and Lin patents thus do not anticipate the claims of the '793 patent, nor do they make those claims obvious when read together or in conjunction with other prior art.

Paragraph 6 of Section V of the Nixon Report cites U.S. Patent 6,149,834 by Gall that deals with a corrosion inhibited deicer based on de-sugared beet molasses. The sugar content of de-sugared molasses is stated to "exceed 7 percent, but (is) seldom greater than 20 percent by weight." The patent goes on to state "Carbohydrate content is non-existent since all available carbohydrate material is used during the de-sugaring process." This contradicts the previous statement regarding sugar content since sugar is a carbohydrate. See Exhibit G. Dependent claims 3 and 5 place a lower limit on the protein content, suggesting that the inventors believed that protein played an important role in the performance of their deicer. The Gall patent does not teach the molecular weight range for the carbohydrates and does not disclose the synergy between these carbohydrates and chloride salts. It uses a de-sugared material that is substantially less pure as a source of low molecular carbohydrates than cane molasses if it is a source of carbohydrates at all. The Gall patent does not teach the use of colorants or thickeners in deicer

formulations. The Gall patent thus does not anticipate the claims of the '793 patent, nor does it make those claims obvious when read by itself or in conjunction with other prior art. Also, this patent was filed after the (contested) priority date of the '793 patent.

Paragraph 7 of Section V of the Nixon Report cites U.S. Patent 5,772,912 to Lockyer that teaches the use of xanthan gum as a thickening agent in a deicer formulation. Although the Lockyer patent refers to it as a sugar, xanthan gum has a high molecular weight and is normally described as a gum or polysaccharide, not as a sugar. The formulation disclosed in the Lockyer patent contains neither chloride salts nor low molecular weight carbohydrates. The Lockyer patent does not teach the use of colorants in deicer formulations. The cited prior art thus does not anticipate the claims of the '793 patent, nor does it make those claims obvious when read by itself or in conjunction with other prior art.

Paragraph 8 of Section V of the Nixon Report cites what is stated to be U.S. Patent 5,693,319 to Daly and is purported to describe the use of desugared molasses as ballast for tires. In fact, the patent with the stated number is to Tremont and has no bearing on the present litigation. The actual patent is US 5,639,319 and claims a wheel, not a deicer or anti-icer. Nixon states: "The patent makes clear the freeze point depressant effect of sugar containing materials, at percentages of approximately 7.5% sugar." Again, the fact that sugars depress the freezing point of aqueous solutions is not contested, but the low freezing pointed cited in the Daly patent for the molasses (- 30°F) cannot be caused by a mere 7.5 or even 15 weight percent sugars. A person of ordinary skill in the art would know that other materials in the mixture have a dominant influence on the freezing point. These other materials include proteins and potassium

compounds in amounts higher than the sugar and carbohydrate content. The Daly patent does not teach the molecular weight range for the carbohydrates and does not disclose the synergy between these carbohydrates and chloride salts. The Daly patent does not teach the use of colorants or thickeners in deicer formulations. Indeed, the Daly patent does not even teach the use of deicer or anti-icer solutions as I believe these terms should be construed. The Daly patent thus does not anticipate the claims of the '793 patent, nor does it make those claims obvious when read by itself or in conjunction with other prior art.

Paragraph 9 of Section V of the Nixon Report cites the abstract of USSR Patent 1664808 to Rudnik that describes the use of calcium chloride or magnesium chloride, ammonia, concentrated molasses solubles (CMS) and water to prevent freeze adhesion of bulk materials. Nixon evidently read only the abstract. Had he read the body, he would have learned that CMS contains a maximum of 5.8 weight percent of carbohydrates of an unspecified nature. Further, the formulation contains a maximum of 1.15% CMS so that the carbohydrate content of the mixture is only about 0.06 weight percent at most. CMS is a distillery slop from which water has been evaporated. See Exhibit H. This is the material that was disclosed in US 4,676,918 to Toth. The Rudnik patent does not teach the use of colorants or thickeners in deicer formulations. The Rudnik patent thus does not anticipate the claims of the '793 patent for the same reasons that the Toth patent does not anticipate them, nor does it make those claims obvious when read by itself or in conjunction with other prior art.

Paragraph 10 of Section V of the Nixon Report cites U.S. Patent 5,635,101 to Janke that describes the use of corn milling byproducts in a deicing formulation. This patent was

considered by the examiner during the prosecution of the '793 patent. Interestingly, the patent does not list carbohydrates as a component of the corn steep water, although a substantial concentration of proteins is listed. Again, a person of ordinary skill in the art would have no reason to suspect that low molecular weight carbohydrates were important in the performance of this formulation, and it is unreasonable to assume a "state of knowledge" on the part of this person that a particular component of corn steep water was especially beneficial. Further, this Janke patent does not teach the molecular weight range for the carbohydrates and does not disclose the synergy between these carbohydrates and chloride salts. The deicer formulation is based on a fermentation waste that has a highly variable composition. Janke '101 does not teach the use of colorants or thickeners in deicer formulations. Janke '101 thus does not anticipate the claims of the '793 patent, nor does it make those claims obvious when read by itself or in conjunction with other prior art.

Paragraph 11 of Section V of the Nixon Report cites U.S. Patent 5,709,813 to Janke that describes the use of vintners' condensed solubles (VCS) as part of a deicer formulation. This patent was considered by the examiner during the prosecution of the '793 patent. The "unfermented sugar" content of VCS is 3.6 weight percent on a dry basis but is only 1.8% in the aqueous solutions actually used in the examples and claims of this Janke patent. The kinds of sugars in VCS are not defined. A person of ordinary skill in the art would have no reason to suspect that sugars were important to the performance of the product. This Janke patent does not teach the molecular weight range for the carbohydrates and does not disclose the synergy between these carbohydrates and chloride salts. The deicer formulation is based on a fermentation waste that has a highly variable composition. Janke '813 does not teach the use of

colorants or thickeners in deicer formulations. Janke '813 thus does not anticipate the claims of the '793 patent, nor does it make those claims obvious when read by itself or in conjunction with other prior art.

Paragraph 12 of Section V of the Nixon Report cites U.S. Patent 5,932,135 to Janke that describes another deicer formulation based on vintners' condensed solubles. This patent was considered by the examiner during the prosecution of the '793 patent. Nixon again misstates the sugar content of the formulation. Even if the deicer was composed entirely of VCS, the sugar content would only be about 1.8 weight percent. This Janke patent does not teach the molecular weight range for the carbohydrates and does not disclose the synergy between these carbohydrates and chloride salts. The deicer formulation is based on a fermentation waste that has a highly variable composition. Janke '135 does not teach the use of colorants or thickeners in deicer formulations. Janke '135 thus does not anticipate the claims of the '793 patent, nor does it make those claims obvious when read by itself or in conjunction with other prior art.

Paragraph 13 of Section V of the Nixon Report cites a paper by Hull et al. that gives the composition of corn steep water, presumed by Nixon to be the same as that used in the '101 Janke patent. The article states that corn steep liquor is a fermented product "officially known as condensed fermented corn extractives." Its composition according to results in the paper, *e.g.* table 1, is extremely variable. Corn steeps from the wet milling industry, presumably those used by Janke, have decreased glucose and fructose concentrations according to the Hull paper. The total carbohydrate concentration of these materials was found to be less that about 20 grams per liter, about 2 weight percent. The amino acids content, corresponding to protein, was

substantially higher. The Hull paper does not teach the use of a chloride salt in aqueous solution with sugars, or the use of colorants or thickeners in deicer formulations. The Hull paper thus does not anticipate the claims of the '793 patent, nor does it make those claims obvious when read by itself or in conjunction with other prior art.

Paragraph 14 of Section V of the Nixon Report cites U.S. Patent 5,135,674 to Kuhajek that describes the use of "gelling" agents to minimize the spalling of concrete (not as freezing point depressants). This patent was considered by the examiner during the prosecution of the '793 patent. The composition is not an aqueous solution as required in all claims of the '793 patent. Rather, the gelling agents are applied to salt as dry powders, as opposed to the liquid compositions claimed in the '793 patent. The patent does not teach the use of a chloride salt in aqueous solution with sugars, nor the use of colorants or thickeners in deicer formulations. The Kuhajek patent thus does not anticipate the claims of the '793 patent, nor does it make those claims obvious when read by itself or in conjunction with other prior art.

Paragraph 15 of Section V of the Nixon Report cites a variety of Bates-labeled documents to show that various carbohydrates comprised a portion of the "Ice Ban" product and that Ice Ban was known to exhibit "synergistic effects" when mixed with road salts and road brines. The evidence for a synergistic effect is based on the deposition testimony of Jeff Johnson who said that the mixture of magnesium chloride and the suspended solids in Ice Ban gives a larger reduction in freezing point than either material on its own. This, of course, is the expected result when two solutes are used as freezing point depressants since the FDP equation in Exhibit F predicts an additive effect. Synergy between the components requires an effect more than

merely additive. *The American Heritage Dictionary* defines synergy as the interaction of two or more agents or forces so that their combined effect is greater than the sum of their individual effects. See Exhibit I. The deicer formulation is based on waste streams that have a highly variable composition. The cited prior art does not teach the use of colorants or thickeners in deicer formulations. The cited prior art thus does not anticipate the claims of the '793 patent, nor does it make those claims obvious when read by itself or in conjunction with other prior art.

Paragraph 16 of Section V of the Nixon Report cites an article that discloses the use of brewers' condensed solubles (BCS) as a component of Ice Ban. The article fails to specify molecular weight and concentration ranges for the carbohydrates. BCS lacks the substantial purity and consistency specified for the sugar sources in the '793 patent. The use of BCS and similar fermentation wastes, including VCS, corn steep water, and CMS, in a deicer formulation, does not anticipate the claims of the '793 patent since patents using these types of waste products were considered by the examiner during the prosecution of the '793 patent. (See also the discussions of the Johnson, Janke, and Rudnik patents above.) The cited prior art fails to render the claims of the '793 patent obvious when read by itself or in conjunction with other prior art.

Paragraph 17 of Section V of the Nixon Report cites Bates Nos. B00129-139 and deposition testimony to raise two issues. The first is an alleged synergy between magnesium chloride and BCS. It is uncertain whether such synergy actually exists. However, even if it does, the '793 patent makes no claim of having found the <u>only</u> synergy between possible components of a deicer. Other synergistic combinations may exist and would presumably be patentable. The second issue raised in Paragraph 17 is whether Bodycote Ortech used standard

techniques to separate the components of BCS. The '793 patent does not claim to have invented any separation techniques. What is disclosed is that the separation led to discovering a specific synergy between some of the components (not just one as suggested by Nixon) with chloride salts. The cited prior art thus does not anticipate the claims of the '793 patent, nor does it make those claims obvious when read by itself or in conjunction with other prior art.

Paragraph 18 of Section V of the Nixon Report cites a variety of Bates-labeled documents to the effect that Caliber was sold as early as August 1999. As a starting point, the alleged sales post-date the (contested) priority date of the '793 patent. In addition, Nixon provides no analysis of the material that was allegedly sold. I have examined a number of invoices, supplied to me by Sears' counsel, for materials called Caliber De-icer, Caliber Concentrate, and Caliber 5000, including an invoice for five gallons dated 8/27/99. The chemical composition of these materials is not specified on the invoices. Stephen C. Bytnar testified: "That is the concentrate. All invoices will be for the concentrate. Minnesota Corn Processors did not have, nor ever did they have, magnesium chloride." I conclude from this that the invoiced product sold during 1999 did not contain a chloride salt and thus did not anticipate the '793 patent. A single analysis performed in June of 2000 by Bodycote Ortech showed 3.1 weight percent sugars for a Caliber product sold during 2000. The indicated composition is only marginally within the carbohydrate range claimed in the '793 patent and, due to possible errors in the chemical analysis, the tested product sold in 2000 cannot be confirmed as being above 3 weight percent. Nixon also mentions products supposedly marketed by Mountain Products and Equipment, but provides no proof or date of sale and no support for his claim that the supposed products "appear to have included low molecular weight carbohydrates as a key component."

The cited prior art does not anticipate the claims of the '793 patent, nor does it make those claims obvious when read by itself or in conjunction with other prior art.

Paragraph 19 of Section V of the Nixon Report cites deposition testimony by Hartley with respect to table 3 of the '793 patent. Nixon states that the data in the table appear to contradict the statement that immediately follows the table. Apparently, Nixon is concerned that Fraction E in that table showed a lesser reduction in freezing point that the BCS mixture. What Nixon apparently misunderstands is that the solids contents of the various fractions listed in table 3 are lower that those for the unfractionated BCS. The quotation of Hartley that the freezing point depression of Fraction E was "not unexpected" was taken out of context and, in the proper context, has no apparent relevance to the validity of the '793 patent. In his immediately proceeding statement, Hartley pointed out that the carbohydrate content of BCS was higher than that of Fraction E.

Paragraph 20 of Section V of the Nixon Report cites deposition testimony by Hartley with respect to tables 5 and 6 in the '793 patent. Nixon infers that the freezing point depression of the low molecular carbohydrate fraction extracted from BCS is not significantly different from that of the unfractionated BCS. This is not the issue. Nixon's comparison is made at different total concentrations of dissolved solids and at different concentrations of dissolved carbohydrates. Table 5 shows that mixtures of magnesium chloride and individual sugars are effective deicers. Table 6 shows that mixtures of magnesium chloride with relatively pure, commercial sources of low molecular weight carbohydrates are also effective deicers. In my opinion, Nixon's conclusion is based on an incorrect interpretation of the data. Even if true,

which I dispute, it is has no significance. The genius of the '793 patent is not that the claimed compositions are necessarily better deicers than compositions that sometimes result from waste mixtures. Instead, the genius of the '793 patent is that excellent deicer and anti-icer performance can be obtained consistently using substantially pure sources of low molecular weight carbohydrates. Nixon's observation in paragraph 20 of Section V of the Nixon Report, even if true, has no bearing on validity.

Paragraph 21 of Section V of the Nixon Report cites various Bates-labeled documents to again suggest that Ice Ban anticipates the '793 patent. The quote attributed to Bodycote Ortech suggesting that Ice Ban is effective as an anti-icer is meaningless in the context of this litigation. Chloride salts, ethylene glycol and VCS are effective anti-icers. The two publications referred to in Paragraph 21 merely say that Ice Ban contains organic compounds that could be derived from agricultural "base stocks" as a condensed residue remaining after the processing of the base stocks. The HITEC publication (C 000381) cited by Weiffenbach indicates that these base stocks could even include milk. The cited prior art thus does not anticipate the claims of the '793 patent, nor does it make those claims obvious when read by itself or in conjunction with other prior art.

3.2 Enablement

Paragraph 22 of Section V of the Nixon Report does not cite any prior art even though it is included in a section entitled "Summary of Relevant References." Instead, it appears to suggest that the '793 patent lacks enablement because the examples span only a small part of the claimed range of compositions, specifically from 19.55 to 32.5 weight percent carbohydrate compared to

the claimed range of 3 to 60 weight percent. What Nixon ignores is the data provided in the various tables of the '793 patents. Carbohydrate concentrations in these tables range from 4.1 weight percent (Table 8) to 75 weight percent (Table 5). Further, Nixon complains that compositions in the claimed range have "the potential to be extremely viscous materials that would not be practicable for use as instructed as an anti-icer or de-icer." No support is provided for this statement, and it appears unlikely to be true. Compositions at the upper limit of carbohydrate concentration have manageable viscosities. See Exhibit J. Compositions at the upper limit of salt concentrations have manageable viscosities (example III of the '793 patent). These viscosities are within the range of claims 4 and 8 of the '793 patent. Even if the viscosity were outside the claimed range, the Janke '813 patent teaches that heat can be used to ease application (c. 5, l.1 - 2). High pressure pumps can also be used according to the Minsk Report (p. 9). Nixon also states: "It is not clear from the results provided in the patent that some of these compositions would be able to form an aqueous solution." The answer to this is that the formation of an aqueous solution is a required element of every claim in the '793 patent. If a composition is unable to form an aqueous solution, then that composition is excluded from the claims. Overall, Nixon seems to misunderstand how composition ranges are interpreted when there are several components. A person of ordinary skill in the art would understand that all component concentrations must lie within the specified upper and lower limits, but would not necessarily expect the invention to be functional when all compositions are at extreme values, say all at their upper limits. This concept is illustrated in Exhibit K. It may even be mathematically impossible to have all concentrations at their extreme values. For example, the combined upper limits on the three specified components (salt, carbohydrate, and thickener) total to 105 percent by weight in claim 4 of the '793 patent.

3.3 Ordinary Skill in the Art

Section VI of the Nixon Report attempts to define a person of ordinary skill in the art as someone with at least a bachelor's degree in a physical science or engineering that includes at least four courses in chemistry including organic chemistry. Nixon also claims that a minimum of five years involvement in the research, development, or characterization of deicing and anti-icing is required. I agree that the equivalent of a baccalaureate degree in chemically oriented science or engineering is needed. However, the corresponding course contents should include physical chemistry and polymer chemistry in addition to the usual college-level exposure to organic chemistry. The specific experience component specified by Nixon is unnecessary. While some practical training and experience beyond a first university degree is needed, this training need not be in winter highway maintenance. For the prior art considered by the examiner or cited by Nixon and Weiffenbach, experience in chemical issues arising in agricultural science, food science or paper science would be more useful. The technological background needed to understand the prior art of road deicers and anti-icers is not particularly extensive or difficult. In my opinion, any necessary field-specific knowledge can be acquired in a few weeks or even days.

3.4 Nixon's Conclusions

Section VII of the Nixon Report states that some of the references in Section V of Nixon Report disclose all of the elements of claims 1, 7, 4 and 8 of the '793 patent. This is not correct in my opinion. No single reference discloses each element of any claim in the '793 patent. My reasons are given in Section 3.1 of this report.

3.5 Inventorship

Section VIII of the Nixon Report concludes that personnel at Bodycote Ortech were the inventors of the '793 patent rather than or in addition to Robert Hartley ("Hartley") and David Wood ("Wood"). To the extent that Nixon is making a legal argument, I have no opinion. However, I am able to opine on the scientific issues and on the practice of research and development in an industrial environment. Regarding the genius of the invention, I understand that it was provided by Hartley and Wood, and that personnel at Bodycote Ortech played the role of skilled but non-inventive technicians. It is common practice in developing a patentable product to use technicians, assistants and even highly skilled, doctoral-level scientists to help reduce the invention to practice without these personal being named as inventors of the product. This is especially true for chemical analyses that are performed by specialists using expensive and specialized equipment. For such tests, and for the routine formulation and evaluation work needed to reduce an invention to practice and to complete a patent application, it is common to use many specialists in technically demanding but non-creative roles. These people may provide guidance and help in the reduction to practice of inventions made by others. Similarly, patent attorneys can provide such help and guidance. Some companies maintain attorneys, laboratory staff, and laboratory equipment for this purpose. Sears lacked these and thus elected to use outside sources. Bodycote Ortech was such a source and in my opinion was non-inventive.

The role of Bodycote Ortech is confirmed by the sworn affidavit of John McNeill of Bodycote Ortech, which contains in part the following statement:

> The concept underlying the '793 Patent was brought to Bodycote by Robert Hartley, a consulting chemist for Sears. Mr. Hartley proposed that Bodycote

perform certain chemical analyses to determine the properties of various deicing solutions. This testing consisted of chemical component testing ordinarily performed by Bodycote. After Bodycote reported the results of these tests to Mr. Hartley, Mr. Hartley requested additional, follow-up tests on various matters. At all times, all testing was conducted under the direction of, and was fully authorized by, Robert Hartley and/or David Wood, Sears' Vice President. Bodycote did not conduct any testing on any of these deicing matters other than specifically ordered by Sears.

3.6 Materiality

Section IX of the Nixon Report is entitled materiality and apparently seeks to establish a scientific basis for a claim of inequitable conduct before the Patent Office. In my opinion such a claim would be incorrect because any publications known to the inventors but not disclosed to the examiner would not have affected the outcome of the prosecution of the '793 patent.

Paragraph 1 of Section IX of the Nixon Report mentions the previously discussed patents of Peel, Neal and Lin, which use spent sulfite liquor that is a waste product of paper processing. In fact, the Peel and Neal patents were before the examiner, being cited as references in the Johnson patent and all three Janke patents that were explicitly disclosed to the examiner. The Neal patent is not germane for the reasons discussed in Section 3.1. Spent sulfite liquor is a highly variable and extremely complex mixture of the type that Wood and Hartley were expressly seeking to avoid. The Peel patent teaches away from the use of sugars. Also, the pentose sugars found in spent sulfite liquor lie outside the range of carbohydrate molecular weights specified in the '793 patent. Had these three patents been cited in the application for the '793 patent, these would have been cited as additional examples of problems associated with waste streams that Wood and Hartley expressly sought to overcome. Nixon also cites the paper by Sebree that describes BCS as resulting from the dewatering of spent mash, including the

addition of waste beer to the spent mash. In the introduction to the Sebree paper, it is stated that the composition of BCS varies between breweries and that their samples were obtained from Anheuser-Busch. They analyzed samples collected successively on 12 days from a single brewery. There are large standard deviations for each measurement even though the 12 individual samples were the average of three separate samples taken during each day. Moreover, Bodycote Ortech analyzed a sample of BCS obtained from Anheuser-Busch and found results for low molecular weight carbohydrates that were significantly different than those reported by Sebree (SP 00957), even allowing for probable error. Specifically, the Sebree paper shows about 8 times more maltose (a disaccharide) and about 8 times less glucose (a monosaccharide). Thus, BCS is an example of the kind of complex and variable waste product that Wood and Hartley were expressly seeking to avoid. Similar remarks apply to the paper by Hull that describes the highly variable materials known as corn steep water. The paper by Murray is deemed relevant by Nixon in that it shows lower molecular weight sugars to be more effective (on a weight but not molar basis) in reducing freezing points than higher molecular weight sugars. As previously discussed, particularly in Exhibit F, this is a fact of elementary chemistry. It could be presumed known by the examiner.

Paragraph 2 of Section IX of the Nixon Report cites the poorly documented composition and commercial history of Ice Ban and Caliber. In my opinion, there is no information of use to the examiner that is not contained in the prior art that was before the examiner. This prior art specifically included the Johnson patent and the three Janke patents.

4. The Weiffenbach Report

The Weiffenbach Report consists primarily of legal arguments. However, Mr. Weiffenbach has a BS and MS in chemistry and makes a number of scientific arguments, even though he claims no expertise in science. I will address these aspects of his testimony.

4.1 Claim Construction

Section IV-A of the Weiffenbach Report address the construction and scope of the claims in the '793 patent. Weiffenbach's proposed construction raises certain issues. I believe that an aqueous solution of various components is a single-phase mixture of the specified components, one of which must be water. I believe that a (liquid) deicer or anti-icer is a formulation that has a freezing point below 0°C (32°F), will melt a quantity of ice if brought into contact with ice, and will prevent or retard the formation of ice on a surface that has been coated with the liquid. I agree that the claimed low molecular hydrocarbons are saccharides, specifically monosaccharides such as glucose and fructose, and oligosaccharides out to a degree of polymerization (DP) that corresponds to the claimed limits on molecular weight. Monosaccharides have a DP of 1 and a molecular weight of 180. Each DP beyond 1 adds an increment of 162 to the molecular weight. For example, sucrose is a disaccharide and has a molecular weight of 342. A hexasaccharide (DP = 6) has a molecular weight of 990 and is the highest oligomer that falls within the range of 180 to 1000. An oligosaccharide with DP = 9 has a molecular weight of 1476 and is the highest oligomer that falls within the range 180 to 1500. I believe that higher saccharides are oligosaccharides in the context of the claims of the '793 patent. I note that the claim language allows for the presence of materials other that the recited low molecular weight carbohydrates, chloride salts, optional colorant, optional thickener, and

water. In this regard, Weiffenbach considers the presence of non-recited materials as being "inconsistent with the description and much of the specification in the patent regarding the need for a pure low molecular weight carbohydrate composition blended with an (sic) salt." Rather that being inconsistent, this points out the need for a claim interpretation, based solely on intrinsic evidence that the carbohydrates be obtained from a substantially pure and consistent source. The source need not be completely pure since this would be technically and economically infeasible. The standard of purity is found in the disclosure and specifically in the maltodextrin and molasses examples given in table 4 of the parent, non-provisional application and in the corn syrup examples disclosed in the issued patent. All three of these materials are a substantially pure source of low molecular weight carbohydrates. All three are established items of commerce and have properties sufficiently reproducible to satisfy the need for a consistent deicer formulation.

I reserve the right to right to submit a more detailed analysis of claims construction should I be asked to do so.

4.2 Priority Date

Section IV-B of the Weiffenbach Report gives Weiffenbach's opinion that the '793 patent is not entitled to the filing dates of either the provisional application (filed January 7, 1998) or the parent, non-provisional application (filed January 4, 1999). The disclosure in the parent, non-provisional application is identical to that in the provisional application except that the parent, non-provisional applications includes table 4 and an introductory paragraph relating to table 4. I will refer to the common parts of the disclosure as the "parent disclosure," recognizing

that the disclosure in the provisional application lacks table 4 and its introductory paragraph. I will use the page and line citations of the parent, non-provisional application.

Weiffenbach quotes from the parent disclosure and concludes that there is no disclosure of carbohydrates within the ranges of molecular weights claimed in the '793 patent. This is incorrect. The passage quoted by Weiffenbach contains the words "sugars (hexoses, saccharides)." These words were even emphasized by Weiffenbach. A person with a background in chemistry should understand that hexoses are sugars having 6 carbon atoms, a molecular weight of 180 and include monosccharides glucose and fructose. See Exhibit G. Further, saccharides include sugars such as glucose and fructose using the definition of saccharide proposed by Weiffenbach. However, subsequently in his report (p. 24), Weiffenbach attempts to define "sugar" as a "sweet crystallizable material that consists wholly or essentially of sucrose." Sucrose has a molecular weight of 342 (not 360 as stated by Weiffenbach on pp. 25 and 27) and is thus a low molecular weight carbohydrate. Even by Weiffenbach's inappropriate definition, "sugar" falls with the range of molecular weight claimed in the '793 patent. A more realistic view, as indicated by the parenthetical construction, "sugars (hexoses, saccharides)," is that the parent disclosure used the term "sugars" to mean monosaccharides (hexoses are monosaccharides) and oligosaccharides. As discussed by Hartley in his deposition, (pp. 76 - 90), an upper limit on the molecular weight of compounds called sugars or saccharides would have been understood by a person of ordinary skill in the art at the time of the invention. As suggested by Hartley (p. 90), the specific value of the upper limit could depend on the age of the chemist. The reason for this is the common usage among chemists that the transition from calling a compound an oligomer to calling it a polymer is whether the individual compounds of a

specific degree of polymerization can be separated from a mixture. The ability to do this has improved with time. The *American Heritage Dictionary*, apparently reflecting early usage when analytical techniques were quite limited, defines oligomer as "A polymer that consists of two, three, or four monomers." The *Oxford English Dictionary* defines oligomer as "Any polymer whose molecules consist of relatively few repeating units" and provides a citation to a 1952 paper that specified DP = 2 to 5. The classic Noller text (Exhibit G) was published in 1951 and specifies that the transition from oligosaccharide to polysacccharide occurs at DP = 6. An oligosaccharide with a DP of 6 has a molecular weight of 990. The Sebree article published in 1983 extends the transition to DP = 7, which corresponds to a molecular weight of 1152. The provisional application was published in 1998, and an upper limit of DP = 9, corresponding to a molecular weight of about 1476, would have been reasonable at that time. I note that Fraction E had been isolated from BCS prior to the filing of the parent, non-provisional application (12/11/98 Bodycote report), so that Hartley and Wood had evidence for the effective range of molecular weights by the time they submitted their application.

The parent disclosure describes a deicer that includes as its key components a freezing point depressant, a film former, and water. The freezing point depressant "melts the ice and snow keeping the resulting ice/snow/liquid water layer liquid down to predetermined lower temperature limits ..." (p. 4, lines 21 - 22). "Generally the freezing point depressant is present in the concentration of about 5 to 30 wt. % of the formulation depending on the temperature demands dictated by region in which the formulation is used" (p. 3, lines. 18 - 22). Suitable freezing point depressants include chloride salts and sugars (hexoses, saccharides). The parent disclosure (p. 4, lines 24 - 25) states that:

> The film former immobilizes the freezing point depressant onto the road surface thus preventing run-off. It is itself a freezing point depressant and so further improves the efficiency of ice melting and aids in the reduction of metal corrosion up to an acceptable level not attainable with present deicing formulations.

"The film former comprises any suitable water soluble or resoluble material" (p. 3, lines 23 - 24). Table 1 of the parent disclosure illustrates a typical operating range for formulations. It shows the "Thickener/Collioid/emulsion" concentration to be 0.15 to 30 weight percent. Within the context of the disclosure, I recognize "Thickener/Collioid/emulsion" and "film former" to be synonymous.

A person of ordinary skill in the art would recognize that sugars, being sticky in water solution and increasing the viscosity of the solution, could act as film formers and thickeners. They are also disclosed as being freezing point depressants. Thus sugars can provide both functions so that the parent disclosure enables sugar concentrations up to 60 weight percent. Combinations such as 15 weight percent magnesium chloride and 45 weight percent low molecular weight carbohydrates are also enabled by the parent disclosure. A composition of about 27 weight percent magnesium chloride and 3 weight percent sugar, the approximate composition of Caliber M1000, would also be enabled. The ranges claimed in the '793 patent have antecedents in the provisional application. Claim 1 of the '793 patents specifies that chloride salts be used as a freeze point depressant. Low molecular weight carbohydrates are specified, and act as a freeze point depressant, as a film former, and as a thickener. Claims 4 and 8 of the '793 patent specify that a material other than low molecular weight carbohydrates can be used as a thickening agent. The kinds of materials disclosed in the specification of the '793 patent include those listed in the parent disclosure (p. 3, line 26 to p. 4, line 11). The molecular

weight limits prescribed in the '793 patent merely reflect the molecular weights of commercially available materials of the types listed in the parent disclosure.

Table 4 of the parent, not-provisional application shows numerous combinations of a chloride salt with various organic compounds that function as film formers, thickening agents and freeze point depressants. Four of the examples (dextrin, maltodextrin no. 5, molasses and maltodextrin no. 15) are carbohydrate mixtures that contain significant amounts of carbohydrates. At least two examples (molasses and maltodextrin no. 15) show low molecular weight carbohydrates within the limits of the '793 patent. Furthermore, these two examples exhibit synergy with the magnesium chloride because the freezing point is depressed more than the sum of the depressions resulting from salt and carbohydrate acting alone (see Exhibit F).

In my opinion, the subject matter of the '793 patent is supported by the specifications in the provisional application and in the parent, non-provisional application. The written description is adequate to motivate a person of ordinary research to try combinations of chloride salts and saccharides as deicer and anti-icer solutions. The sugars to be used would be mono- and oligosaccharides having molecular weights ranging from 180 to about a 1000 or 1500. As discussed previously, the indicated composition ranges would include up to 30 weight percent chloride salt and up to 60 weight percent sugars, but the researcher would recognize that the real limitation was the ability of the components to form an aqueous solution.

4.3 Enablement

Section IV-C of the Weiffenbach Report gives Weiffenbach's opinion that the '793

patent lacks enablement. I believe this opinion to be wrong.

Weiffenbach essentially repeats Nixon's definition of a person of ordinary skill in the art. As discussed in Section 3.3 of this report, I do not believe that five years experience in the research and development of deicing and anti-icing chemical compositions is necessary to make and use the invention. I believe that any necessary and specialized skills can be acquired in days or weeks. Furthermore, there is no need for specific experience in winter highway maintenance, particularly since a major aspect of winter highway maintenance is snow removal via plowing rather than snow and ice melting (Minsk report). Other applications for deicer and anti-icer compounds are described in the Johnson and Janke patents, and the claims of the '793 patent in no way restrict the use of the patented formulations to winter highway maintenance.

Weiffenbach states that compositions containing "... 40%, 50%, or 60% by wt. low molecular weight carbohydrates may be so thick as to be inoperative..." This is mere conjecture, unsupported by any evidence put forth by either Weiffenbach or Nixon. I understand that an issued patent is presumptively valid so that the burden rests with Weiffenbach and Nixon to prove lack of enablement. Furthermore, I understand that there is no need and sometimes not even the possibility for an invention to be functional when the various composition variables are simultaneously at extreme values. This concept is illustrated in Exhibit K and is manifestly true for claim 4 where the upper limits sum to 105 weight percent. Thus, for the issue at hand, the invention should be functional when the carbohydrate content is 60 weight percent for some but not necessarily all values of chloride salt contents within the range from 5 to 35 weight percent. As shown in Exhibit J, the viscosity of even a 65% solution of sugar is within the range of

viscosities stated in claims 4 and 8 of the '793 patent. Furthermore, as discussed in Section 3.2 of this report, means exist for using high viscosity solutions. Also, as discussed in Section 3.2, if some compositions are incapable of forming aqueous solutions, then such compositions are excluded from the claims. A similar remark applies to Claims 4 and 8 with respect to compositions that give viscosities outside the stated range.

4.4 Inventorship

Section IV-D, subsection 1 of the Weiffenbach Report gives Weiffenbach's opinion that Hartley and Wood were not the co-inventors of the '793 patent. There are two issues here: whether one or more Bodycote Ortech personnel was an inventor and whether David Wood was an inventor.

I have discussed the role played by Bodycote Ortech in Section 3.5. Weiffenbach raises additional points largely based on communications from Bodycote Ortech to Sears. It appears to me that Bodycote Ortech documented all results in a comprehensive and systematic manner that does not imply inventorship. For example, communications dated February 18, 1999 and March 29, 1999 include the discussion of results that were known or could readily be deduced from the data included in table 4 of the parent, non-provisional application that was filed on January 4, 1999. Based on a report dated August 30, 1999, Weiffenbach concludes: "The idea of using a thickener came from either Mr. McNeill (sic)." In fact, the use of thickeners was disclosed in the provisional application that had been filed more than a year and a half earlier. Moreover, the cited exhibit (Weiffenbach Exhibit 29) shows that Sears (via Hartley) was closely directing the work done by Bodycote Ortech, consistent with my opinion that Bodycote Ortech merely

performed non-inventive services for hire.

Weiffenbach concludes that Wood made no contribution to the claimed invention. This conclusion appears to be based in part on based on Wood's deposition testimony, but in it, Wood does not disavow inventorship. Indeed, his statement cited by Weiffenbach that "Along the way we discovered a number of things which we've discussed earlier today" indicates that Wood participated in the research. The various reports sent by Bodycote Ortech to Wood are documentation of the overall project status rather than announcements of invention. The content of conversations between Wood and Hartley have not been disclosed. I understand that Wood is presumptively a co-inventor of the '793 patent, and I conclude that Weiffenbach's contrary assertions about inventorship have not been proved.

4.5 Anticipation

Section IV-D, subsection 2 of the Weiffenbach Report alleges that the '793 patent was anticipated by the Janke '813 patent. This allegation is incorrect. One error is that the vintners' condensed solubles (VCS) as described in Janke '813 contain only 1.8 weight percent unfermented sugars on the wet basis actually used in the formulations. See the right hand column of the table in column 4 of Janke '813. Experiments using up to 60 weight percent solids are described (c. 6, lines 5 - 7), but the content of unfermented sugars in these formulations is only about 2 weight percent and is thus outside the range claimed in the '793 patent. Another error is Weiffenbach's choice of an inappropriate definition of sugar. Weiffenbach chose the first definition in *Webster's Ninth New Collegiate Dictionary*. This definition can be characterized as the household or layperson's definition. It is not the chemical definition. The

second definition, also given in *Webster's Ninth New Collegiate Dictionary*, is "any of various water-soluble compounds that vary widely in sweetness and include the oligosaccharides (as sucrose)." While lacking in technical precision (compare Exhibit G), this definition is far more suitable for use in the chemical context of the patent. Note that Janke '813 used the plural form, "sugars," clearly indicating that there is more than one kind of sugar. VCS is obtained as a waste product of the fermentation of grape sugar. Grape sugar consists primarily of dextrose (glucose), not sucrose. See the definition of "grape sugar" in *Webster's Ninth New Collegiate Dictionary.* Weiffenbach continues with the statement that: "The carbohydrate disclosed by Janke(I) is a 'higher saccharide' based on glucose and/or fructose as required by claims 1, 2 and 7. " Weiffenbach has no basis for this statement other than his inappropriate definition of sugar. In fact, the composition of the "unfermented sugars" is unknown. Since Janke '813 was cited during the prosecution of the '793 patent, Weiffenbach is forced to assume that the examiner made an error in failing to consider the unfermented sugar content of VCS. A more plausible assumption is that the examiner recognized that numerical values in a chemical analysis depend on whether the composition is reported on a wet or dry basis, so that the sugars content (of whatever types) was too low to anticipate the ranges cited in the '793 patent. Another assumption is that the examiner considered the use of a fermentation waste to be contrary to the teaching of Hartley and Wood that the low molecular weight carbohydrates be obtained from a substantially pure and consistent source. I note also that Janke '813 does not teach the use of colorants or thickeners in deicer solutions.

Section IV-D, subsection 3 of the Weiffenbach Report alleges that the '793 patent was anticipated by the Janke '135 patent. This allegation is incorrect. Weiffenbach repeats the error

of confusing wet and dry bases for chemical analyses. He again asserts that the VCS contains sucrose, his assertion based on nothing more that his inappropriate choice of definitions. He makes an addition error in claiming that sucrose has a molecular weight of 360. It does not. Further, the carbohydrates are not obtained from a substantially pure and consistent source. I note also that the Janke '135 does not teach the use of colorants or thickeners in deicer solutions, and that Janke '135 was considered by the examiner during the prosecution of the '793.

Section IV-D, subsection 4 of the Weiffenbach Report alleges that the '793 patent was anticipated by the Janke '101 patent. This allegation is incorrect. Janke '101 discusses the use of corn steep water solubles, obtained by the wet milling process, as a component in deicer formulations. Weiffenbach alleges that the meaning of corn steep water solubles is not defined in the specification of Janke '101. This is incorrect. A detailed analysis is given in the table in column 4 of Janke '101. Rather than relying on the specification, Weiffenbach bases his conclusion on his reading of the paper by Hull (Weiffenbach Exhibit 36). Weiffenbach either misunderstood or misrepresented the contents of the Hull paper. Weiffenbach claims "corn steep water is predominantly monosaccharides of glucose and fructose." What the paper actually says in the Results and Discussion section is that: "Glucose and fructose are the predominant monosaccharides, with smaller amounts of galactose, arabinose, and occasionally xylose." There are many components in corn steep water solubles other that monosaccharides. Note also that xylose is a 5 carbon sugar and is thus outside the molecular weight ranges claimed in the '793 patent. As shown in table 1 of the Hull paper, the total carbohydrates were less than 2 weight percent for each of the 11 types of corn steep waters that were analyzed by Hull and coworkers. The carbohydrate concentration was less than the protein concentration (reported as amino acids)

in all eleven samples. Thus, the carbohydrates are not obtained from a substantially pure and consistent source. I note also that the Janke '101 does not teach the use of colorants or thickeners in deicer solutions, and that the Janke '101 was considered by the examiner during the prosecution of the '793.

Section IV-D, first subsection 5 (Weiffenbach has two subsections 5) of the Weiffenbach Report alleges that the '793 patent was anticipated by the Johnson patent. I disagree. Most of the claims do not involve chloride salts. Those that do involve chloride salts give no indication of amount. To the extent that the carbohydrate content can be determined in the examples, it is below 3 weight percent. The Johnson patent does not teach a molecular weight range for the carbohydrates and does not disclose the synergy between low molecular weight carbohydrates and chloride salts. The Johnson patent uses an ill-defined, fermentation waste that lacks the consistency of the formulations claimed in the '793 patent. As discussed in Section 3.1, the extreme variability of this waste material is confirmed by the Sebree paper. The Johnson patent reports only broad ranges for selected components. The source of the BCS was not revealed. Despite the broad limits, some of the values reported in the Johnson patent (tables I and II) are inconsistent with values in the Sebree paper, even allowing for analytical error. It is thus unclear whether and to what extent the Sebree paper applies to the BCS used by Johnson. The Johnson patent does not specify the molecular weights of the carbohydrates in the BCS used in the examples, and any assumption that these carbohydrates are identical to or even similar to those studied by Sebree is conjecture. It is clear from the Johnson patent and from Johnson's deposition testimony that Johnson had no idea as to which components of BCS or other waste streams were especially effective. The claims of the Johnson patent indicate that proteins were

believed to be the important component. I again point out that the fractionation of BCS led to the conclusion and to the invention of the '793 patent that combinations of chloride salts and low molecular weight carbohydrates are especially effective deicers and anti-icers. I note also that the Johnson patent does not teach the use of colorants or thickeners in deicer solutions, and that the Johnson patent was considered by the examiner during the prosecution of the '793.

4.6 Prior Public Use

Section IV-D, second subsection 5 of the Weiffenbach Report alleges that the '793 patent is invalid because deicer compositions falling within the claims of the '793 patent were in public use more than one year prior to the priority date of the '793 patent. It is arguable whether such use constituted experimental testing or marketing. Regardless, in Section IV-C, subsection 5 of his report, Weiffenbach states that the products being tested or used were based on corn steep water. As discussed in Section 4.5, corn steep water contains less that 2 weight percent total carbohydrates and higher amounts of proteins. Thus the carbohydrates were not obtained from a substantially pure and consistent source. Janke '101 would presumably cover the products being tested. This patent was considered by the examiner during the prosecution of the '793 patent. The '793 patent was granted despite Janke '101 and thus would have been granted despite the sale of products based on the Janke '101.

4.7 Prior Sale

Section IV-D, subsection 6 of the Weiffenbach Report alleges that the '793 patent is invalid because deicer compositions falling within the claims of the '793 patent were sold prior to the priority date of the '793 patent. As discussed in Section 4.2, the priority date is contested

by the parties. Notwithstanding this disagreement, it is my opinion that the product described by Weiffenbach did not fall within the claims of the '793 patent. In Section IV-C, subsection 5, Weiffenbach states that Ice Ban Magic " is a 1:1 volume mixture of 26-30% $MgCl_2$ and Ice Ban™, an agricultural product of corn steep water." Such a mixture would not fall within the claims of the '793 patent for the reasons outlined in Sections 4.5 and 4.6 of this report. Subsequently, in Section IV-C, subsection 6, Weiffenbach relies on a statement by McNeill that Ice Ban is based on BCS (rather than corn steep water). Whether this is true is unclear, but even if true, it has no bearing. Neither BCS nor corn steep water is a substantially pure and consistent source of low molecular weight carbohydrates. Further, the examiner was aware of the Johnson patent and that the fractionation of BCS showed the presence of low molecular weight carbohydrates. The '793 patent was granted despite the Johnson patent and thus would have been granted despite the sale of products based on the Johnson patent.

Weiffenbach also alleges that a product known as Caliber M1000 was sold prior to the priority date of the '793 patent and that this products falls within the claims of the '793 patent. The priority date of the '793 patent is contested. If the priority date of either the provisional application or the parent, non-provisional application is upheld, there then there is no issue because the first sale of any Caliber product occurred after that date. Even if not, as stated in Section 3.1 above, the product shown by invoices to have been sold as Caliber during 1999 contained no chloride salts. Further, the product brochure attached as part of the trademark application (Weiffenbach Exhibit 44) gives no description of the carbohydrates in Caliber. Weiffenbach misstates the cited testimony of Stephen Bytnar by claiming that Caliber M1000 "is a 1:1 blend of 30% by wt. low molecular weight carbohydrate concentrate with and 30 by wt.%

solution of magnesium chloride." In fact, Mr. Bytnar testified: "Caliber M1000 is a blend of the Caliber concentrate mixed with 30 percent magnesium chloride in a ratio of 90 percent by volume magnesium chloride, 10 percent by volume Caliber concentrate." Thus the blend ratio is 90:10 rather than 1:1. A single analysis of a Caliber product sold during 2000, which Bodycote Ortech performed in June of 2000, showed 3.1 weight percent of low molecular weight carbohydrates. The indicated composition is only marginally within the carbohydrate range claimed in the '793 patent and, due to possible errors in the chemical analysis, the tested product sold in 2000 cannot be confirmed as being above 3 weight percent.

4.8 Obviousness

Weiffenbach asserts that the invention of the '793 patent was obvious in light of various combinations of the prior art. I understand that obviousness is to be judged by someone of ordinary skill in the art. It may also be asserted or denied by a technical expert. However, I challenge Weiffenbach's qualifications to testify with respect to the factual issues underpinning obviousness in this case. Nevertheless, I rebut his assertions in what follows.

Perhaps the most important proof of lack of obviousness is discussed in my expert report on trade secrets. For the period 5/6/97 through 3/15/99, Dr. Koefod of Cargill conducted numerous experiments on deicer formulations, but none of these experiments included low molecular weight carbohydrates as the major components. I believe that Dr. Koefod had more than ordinary skill in the art. Prior to March 1999, Dr. Koefod had a doctorate in chemistry and substantial experience in product development including nearly two years experience in deicer and anti-icer formulation. The special efficacy of low molecular weight carbohydrates in deicer

and anti-icer formulations was not obvious to Dr. Koefod. It was only after Sears' disclosure to Cargill that Dr. Koefod began experiments using low molecular weight carbohydrates from a substantially pure and consistent source, *i.e.* cane molasses.

Section IV-E, subsection 1 of the Weiffenbach Report alleges that the '793 patent is obvious in view of Janke '813 or Janke '135 combined with Kuhajec and Hu. I disagree. As discussed in Sections 3.1 and 4.5, the Janke references are deficient in that they fail to disclose a concentration of low molecular weight carbohydrates within the range 3 to 60 weight percent from a substantially pure and consistent source. The Kuhajec patent teaches the use of a thickening agent. The Hu patent teaches the use of a colorant. Neither overcomes the limitation of the Janke citations nor renders independent claims 1, 4, 7 or 8 of the '793 patent obvious.

Section IV-E, subsection 2 of the Weiffenbach Report alleges that the '793 patent is obvious in view of Janke '101 combined with Hull, Kuhajec and Hu. I disagree. As discussed in sections 3.1 and 4.5, the Janke '101 and Hull references, even if taken together, do not anticipate the concentration and molecular weight ranges of the carbohydrate component in the patented deicer formulation, nor do they suggest that these carbohydrates should be obtained from a substantially pure and consistent source. The Kuhajec patent teaches the use of a thickening agent. The Hu patent teaches the use of a colorant. Neither overcomes the limitation of the Janke '101 citation nor renders independent claims 1, 4, 7 or 8 of the '793 patent obvious.

Section IV-E, subsection 3 of the Weiffenbach Report alleges that the '793 patent is obvious in view of the combined teachings of Johnson, Sebree, Kuhajec and Hu. Again I

disagree. As discussed in Sections 3.1 and 4.5, the Johnson and Sebree references, even if taken together, do not anticipate the concentration and molecular weight ranges of the carbohydrate component in the patented deicer formulation, nor do they suggest that these carbohydrates should be obtained from a substantially pure and consistent source. I repeat my opinion that the Sebree paper would not have changed the examiner's opinion regarding the novelty of the '793 patent. The Kuhajec and Hu references do nothing that would alter the examiner's opinion.

Section IV-E, subsection 4 of the Weiffenbach Report alleges that the '793 patent is obvious in view of a commercial produce (Ice Ban Magic) and the combined teachings of five separate references: publications by HITEC, Sebree, and Hull plus the Kuhajec and Hu patents. I disagree. The need to combine six references seems to negate a claim of obviousness. The HITEC publication (C 000381) states that Ice Ban is the concentrated liquid residue of the processing of grains and other agricultural products, including corn, barley and milk. Nothing suggests that the efficacy of Ice Ban is due to low molecular weight carbohydrates. The Sebree and Hull papers merely give analyses of two of the many possible agricultural residues that could be used in Ice Ban according to the HITEC publication. Nothing in these papers points to low molecular weight carbohydrates as being especially effective as components of deicer and anti-icer formulations. Again, the Kuhajec and Hu patents do not address the nature and quantity of the carbohydrates claimed in the '793 patent. None of the cited references suggests the use of substantially pure carbohydrates obtained from a consistent source.

Section IV-E, subsection 5 of the Weiffenbach Report alleges that the '793 patent is obvious in view of a commercial product (Caliber M1000) and the combined teaching of

Kuhajec and Hu. I disagree. As discussed in Section 4.7, the Caliber products documented to have been sold during 1999 contained no chloride salts. The analysis of the Caliber product performed by Bodycote Ortech was done after the experiments that lead to the identification of Fraction E and after the filing of the parent, non-provisional application. The Kuhajec and Hu patents do not address the nature and quantity of the carbohydrates claimed in the '793 patent.

4.9 Unexpected Results and Synergism

Section IV-F of the Weiffenbach Report questions whether the results disclosed in the '793 patent were unexpected or showed synergism. I have previously defined and discussed the synergism that Hartley and Wood observed between magnesium chloride and low molecular weight carbohydrates. See Exhibit F and Section 3.1. This synergy, which I submit was unexpected at least with respect to one of the causative agents, is inherent in the parent, non-provisional disclosure and in the '793 disclosure itself. Weiffenbach claims that this and perhaps similar synergies were well known prior to the date of invention of the '793 patent. However, no published references are cited. If this synergy was known, it seems to have been kept as a trade secret without public disclosure. Such private knowledge, even if it existed, has no bearing on the patentability of the Hartley and Wood invention. Furthermore, Hartley and Wood made no claim as to discovering all possible synergies or of discovering all unexpected results involving the use of chloride salts and organic chemicals as deicers or anti-icers. Other synergies may exist and would be discoverable through (possible exhaustive) experimentation or through inventive genius.

4.10 Failure to Disclose

Section IV-G of the Weiffenbach Report alleges that Sears engaged in inequitable conduct by failing to disclose documents that were material to the prosecution of the '793 patent. Some of the alleged failures to disclose have been addressed in Section 3.6 of this report, but Weiffenbach raises additional issues that I will address. Weiffenbach gives three criteria for establishing inequitable conduct. The information withheld from the Patent Office must have been material, it must have been known to be material, and it must have been withheld with intent to deceive or mislead. I will address the first criterion. I understand that information is material if it is or was likely to affect the outcome a patent prosecution.

Section IV-G, subsection 1 of the Weiffenbach Report asserts that the Sebree article was material in that it showed BCS to contain significant amounts of low molecular weight carbohydrates. Hartley and Wood do not claim to have been the first to analyze BCS. The analysis done under their direction revealed a complex mixture that contained significant quantities of low molecular weight carbohydrates. The results of this analysis were revealed in the patent disclosure. A comparison of these results with those reported in the Sebree paper adds no material information, but does show that BCS is highly variable even when obtained from a single supplier. What Hartley and Wood did was to measure the effectiveness of various fractions of one sample of BCS. They found one fraction, containing low molecular weight carbohydrates, which was especially effective as a deicer or anti-icer. The existence of this fraction, but not its efficacy, could have been deduced from the Sebree paper. A person of ordinary skill in the art would have suspected the existence of this fraction in BCS even without reading the Sebree paper since BCS is the residue from a fermentation process for beer that

begins with a mixture containing sugars. The existence of low molecular weight carbohydrates in BCS is not unexpected, and it was not said to be unexpected in the '793 patent. The existence of these carbohydrates in BCS was critical to the invention, but this existence was reported in the patent disclosure. The Sebree paper would have been confirmatory and cumulative at best. In my opinion, it would not have changed the examiner's decision to grant the '793 patent.

Section IV-G, subsection 2 of the Weiffenbach Report asserts that the Hull article was material in that it showed corn steep water to contain significant amounts of low molecular weight carbohydrates. The steep in the wet milling is an acid hydrolysis (SO_2 plus water gives an acid) of the milled corn. See Exhibit L. A person of ordinary skill in the art would know that this process will convert some of the corn starch to sugars. Thus the presence of sugars in the steep water is unsurprising. The Hull paper merely confirms what could have been logically deduced by a person of ordinary skill in the art and indeed was disclosed in the '793 patent (c. 1, lines 49 - 53). In no way does the Hull paper suggest that the sugars found in steep water would be especially effective as components of deicers and anti-icers. In my opinion, the Hull paper would not have changed the examiner's decision to grant the '793 patent.

Section IV-G, subsection 3 of the Weiffenbach Report asserts that the existence of Ice Ban Magic was material in that it showed that products containing BCS were being marketed. I understand that Ice Ban Magic was at least sometimes based on BCS and that BCS contains significant amounts of low molecular weight carbohydrates. The Johnson patent describes such formulations, and the examiner considered the Johnson patent during the prosecution of the '793 patent. The fact that a composition similar or identical to that described in the Johnson patent

was actually being sold would have no effect on the examiner's decision to allow claims in the '793 patent.

Section IV-G, subsection 4 of the Weiffenbach Report asserts that the existence of Caliber M1000 was material in that it allegedly showed that products containing more than 3 weight percent sugars were being marketed before the continuation-in-part application of the parent, non-provisional application was filed. However, the parent, non-provision application, and table 4 thereof in particular, had already revealed the synergy of low molecular weight carbohydrates and chloride salts. The invention thus had already been made by the time the Caliber products were introduced. In my opinion, the existence of the Caliber products would not have changed the examiner's decision to grant the '793 patent

5. Conclusions

The reports by Nixon and Weiffenbach assail the validity of the '793 patent and the conduct of Sears during the prosecution of that patent. My foregoing remarks have rebutted their assertions. In my opinion, neither Nixon nor Weiffenbach have presented evidence to show the patent to be invalid or Sears to have acted improperly. My observation and opinions regarding the Nixon and Weiffenbach Reports are summarized below.

5.1 Anticipation

My opinions are given in Sections 3.1 and 4.5. No single reference anticipates each and every element of the claims in the '793 patent. In particular, references using agricultural waste products such as those described in the Janke and Johnson patents were considered by the

examiner and found not to anticipate the claims of the '793 patent even though the composition of BCS was revealed in the disclosure.

5.2 Obviousness

The key limitation in the '793 patent is the specification of relatively pure carbohydrates obtained from a consistent source in specific molecular weight and composition ranges. This limitation was not made obvious by the prior art, taken either alone or in combination. As discussed in Section 4.8, perhaps the most telling evidence is that Dr. Koefod spent nearly two years without discovering the efficacy of low molecular weight carbohydrates in synergistic combination with chloride salts.

5.3 Prior Public Use and Sale

The Ice Ban products are disclosed in the Janke and Johnson patents that were considered by the examiner. Their public use and sale has no bearing on the validity of the '793 patent. Some Caliber products may or may not have a sugar content that lies marginally within the range specified in the '793 patent. However, sale of the first Caliber products in 1999, which contained no magnesium chloride, occurred after the filing of the parent non-provisional application.

5.4 Enablement

Neither Nixon nor Weiffenbach has presented evidence that the compositions claimed in the '793 patent lack function as deicers when the limitations of the claims are satisfied. The burden of proof rests with them and they have not satisfied it.

5.5 Inventorship

Neither Nixon nor Weiffenbach has presented evidence that David Wood was not an inventor of the '793 patent. The burden of proof rests with them and they have not satisfied it. Similarly, they have not proved that personnel at Bodycote Ortech played an inventive role.

5.6 Inequitable Conduct

In my opinion, the information that Sears is alleged to have withheld from the examiner was not material. In particular, the Sebree paper gives no relevant information beyond what was already disclosed in the patent application.

______________________________ ______________________________

E. Bruce Nauman Date

Revised January 8, 2004

Resume of E. Bruce Nauman

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Professor, Rensselaer Polytechnic Institute		1981-Present
Director, Industrial Liaison		1984-Present
Chairman		1981-1984
Professor	University of Tennessee	1980-1981
Adjunct Professor	SUNY at Buffalo	1980
Adjunct Professor	University of Rochester	1979-1980
Demonstrator	University of Leeds	1962-1963
Instructor	University of Tennessee	1960-1961

Industrial Experience

Xerox Corporation, Rochester, New York, 1977 - 1981

R&D Manager, Materials Engineering (1978 to 1981)
Line management position with responsibility for process engineering, materials development and analytical services. Product areas included xerographic toner, carrier and paper products. Supervised 120 man technical staff.
Program Manager, Product Technology (1977 to 1978)

Matrix management position with a $15 MM budget for R&D on copiers and duplicators. Responsibilities included consumable materials and xerographic process development. Supervised program management staff of twenty.

Union Carbide Corporation, New York, New York, 1963 - 1977

Product Manager, Performance Plastics (1975 to 1977)
General business management of a $15MM complex with a major commitment to growth through new product development and product acquisition. Overall profit and loss responsibility included pricing, sales and marketing, research and development. Introduced two new engineering polymers. Extensive domestic and overseas licensing experience.

Manager of Business Strategy Development (1973 to 1975)
Corporate staff position aimed at new business opportunities. Defined and obtained top management endorsement of a major thrust into engineering plastics and composites.

Technology Manager, Styrene and Polystyrene (1969 to 1973)
Combined business team and R&D line responsibility. Business team accomplishments include all technical input for a major expansion and modernization of $90MM business complex plus coordination of licensing activities and several joint development programs with other companies. Credited with $5MM in licensing sales. R&D line activities included supervision of fifteen professionals. In 1972 responsibilities broadened to include formation of an operations research group to serve the chemicals and plastics areas of Union Carbide.

Group Leader (1965 to 1969)
R&D line responsibility for process engineering group of five professionals. Experience included engineering and start-up of new styrene polymerization process and plastics compounding operations.

Engineer (1963 to 1965)
Product and process R&D in the polymers area.

Professional Activities and Honors

Supervised 27 doctoral theses
Fellow, American Institute of Chemical Engineers.
Winner of 2000 NAMF Award of the American Institute of Chemical Engineers
Associate Editor, The Chemical Engineering Journal.
Associate Editor, Transactions of the Institute of Chemical Engineers
Associate Editor, The Butterworth Series in Chemical Engineering.
Past President, North American Mixing Forum of the AIChE.
Visitor, Accreditation Board for Engineering & Technology.
Expert, National Council of Examiners for Engineering and Surveying
Lecturer, University of Wisconsin and AIChE Short Courses
Chairman, Eleventh Engineering Foundation Conference on Mixing, 1987.
Invited Lecturer to 30+ universities including several named lectureships.
Member, Princeton University Advisory Council, 1980 to 1984.

Chairman, First Engineering Foundation Conference on Chemical
Reaction Engineering, 1983.
Winner of 1974 John C. Vaaler Award for New Product Development.
Union Carbide nominee for White House Fellow, 1971.
NSF Graduate Fellowships at University of Tennessee and University of Leeds.
Phi Kappa Phi, Sigma Xi, and Sigma Tau Honoraries.
Member AIChE, ACS, AAAS, ACCCE, LES.

Listed in: Who's Who in Engineering, American Men and Women of Science,
Who's Who in the East, Who's Who in Technology,
Who's Who in American Education, Who's Who in Science and Engineering

Technical Publications

Archival Journals

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Chen, M. H. and **Nauman, E. B.**, "An Investigation of Phase Ripening in Particulate Binary Polymer Blends," Accepted for *J. Poly. Sci. B, Poly. Physics,* 2003.

Nauman, E. B. "On the Measurement of Stagnancy in Continuous-Flow Systems", *I &E C Res.*, **43**, 304-308 (2004).

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Kosto, T. J., **Nauman, E. B.**, "A density-functional model for controlled release", *J.Controlled Release,* **93**, 301-308 (2003).

Thakur, R. K, Vial, Ch., Nigam, K. D. P., **Nauman, E. B.**; and Djelveh, G., " Static mixers in the process industries", *Chem. Eng. Res. Des.*, **81**, 787-826 (2003).

Chen, M. H. and **Nauman, E. B.**, "Non-linear diffusion with concentration-driven flows in miscible systems", *Polymer,* **44**, 6707-6712 (2003).

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Russo, A, P. and **Nauman, E.B.**, "Modeling the Effect of Compatibilizers in the Coarsening of Ternary Polymer Blends with Core-Shell Morphology", *J. Poly. Sci., Part B: Poly. Phys., 38,* 1301-1306 (2000).

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Mathur, D., Hariharan, R., and **Nauman, E.B.**, "A Scaling Model for the Prediction of Micellization of Diblocks in Polymer Melts", *Polymer, 40,* 6077-6087 (1999).

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Doctoral Theses Supervised

1	Ramesh Mallikarjun	1985	Modeling and optimization of bulk polymerizations in tubular reactors
2	Chi-Chin Chen	1986	Polymerization in a laminar flow tubular reactor
3	Keith Dackson	1986	Low Reynolds number entrance flows and analysis of motionless mixers
4	Muhammad Atiquallah	1988	Modeling and measurement of micromixing effects on bulk copolymerization in a stirred tank reactor
5	Nitash P. Balsara	1988	Phase transitions in polymer mixtures with application to compositional quenching
6	Hugh McLaughlin	1988	Modeling condensation polymers in tubular flow reactors
7	Holly A. Haughney	1989	The application of a cell maintenance model and a bioenergetic model to the fermentation of glucose to 2,3-butanediol by Bacillus polymyxa.
8	Robert E. Winkler	1989	A comprehensive kinetic model for the simultaneous polymerization and degradation of styrene/polystyrene mixtures
9	Shiann-Hsiung Liu	1989	Study of toughening mechanisms of rubber-modified thermosets by compositional quenching process
10	Murali V. Ariyapadi	1990	Time evolution of phase structure in blends formed by compositional quenching
11	John S. Furno	1990	Rubber modification of polyimides through the process of compositional quenching
12	Trupti Mankad	1991	Effect of oxygen on product distribution in bacillus polymyxa fermentations
13	Teresa A. Grocela	1992	Impact modification of polystyrene as a function of the rubber phase parameters.
14	Rocco A. Jerry	1992	The phase behavior of a binary mixture near a surface
15	Niraj Vasishtha	1993	Hydrodynamic effects on the phase separation of polymer blends
16	Ashim Dutta	1994	Rubber modification of phenolic resin via compositional quenching
17	Ambrish P. Srivastava	1994	Kinematics of dissolution of semi-crystalline polymers with applications to polymer recycling
18	Dong-Min Kim	1996	Anionic Polymerization of Styrene in a Tubular Reactor
19	David Qiwei He	1996	Phase separation and the design of polymer blends
20	Timothy J. Cavanaugh	1998	Polymer Blends: A study of the Morphological,

			Interfacial, and Ripening Behavior
21	Devesh Mathur	1998	Structure-property relationships of polystyrene/rubber bulk blends produced by compositional quenching
22	Jerry C. Lynch	2000	Impact modification of polypropylene as a function of rubber toughening parameters
23	A. Peter Russo	2000	Modeling diffusion and coalescence in compatibilized polymer blends
24	Senthil Kandasamy	2001	Scaling and domain growth in ternary amphiphilic systems
25	Joseph T. Savaco	2001	Modeling of Diffusion during Styrene Polymerization in Tubular Reactors
26	Mary H. Cheng	2002	Ripening Mechanism for Binary Polymer Blends
27	Timothy Kost0 II	2003	Mass Transfer in Polymer Blends

Partial List of Industrial Consulting Assignments

Allied-Signal Corporation
Alcan International (Canada)
Arco Chemical Company
AtoHaas North America
Brown and Caldwell
Burmah-Castrol Inc.
Calgon Carbon Corporation
Cargill Incorporated
Chemdahl Corporation
Chevron-Phillips Chemical Company
DeVera Trading & Mfg. Corp. (Philippines)
Dow Chemical Company
Dow Corning Corporation
DuPont of Canada (Canada)
E Ink Corporation
Elf Atochem
Englehard Corporation
Flad & Associates
Fina Oil and Chemical Company
General Electric Company
General Motors Corporation
Great Lakes Chemical Company
Henkel Corporation
Heritage Research Group
Hoescht Celanese Corporation
Input/Output Corporation
International Specialty Products
Johnson & Johnson Company
Kaucuk a.s. (Czech Republic)
MeadWestvaco Corporation
Miwon Petrochemical Corp. (Korea)
Monsanto Company
3M
Nalco Chemical Company
National Institute of Standards and Technology
Novacor Chimie (Canada)
NL Chemicals
Norton Company
Phillips Petroleum Company
Procter & Gamble Company
Rohm & Haas Company
Schenectady International, Inc.
Simmons Engineering
Sindat Engineering (Czech Republic)
Tel Tech
Texaco Chemicals
Toyota Motor Corporation (Japan)
Union Carbide Corporation
Uniroyal Chemicals
Xerox Corporation

Partial List of Legal and Insurance Clients

Client or law firm	Type of case	My client
Adair & Kaul	Plastics failure	**Schott** vs. Stihl Company
Akin Gump Hauer & Feld	Hazardous waste disposal	Gelman Sciences, Inc. vs. **Dow Chemical et al.**
Akin Gump, Hauer & Feld	Toxic tort	Several Individuals vs. **W. R. Grace et al.**
Anderson, Kill, Olick and Oshinsky	Superfund site	Schering Plough vs. **Evanston et al.**
Andrus, Sceales, Starke & Sawell	Patent dispute	**Molecular Bioproducts** vs. Pores Bio Products
Arnold & Porter	Due diligence, TOSCA	**Ethyl Corporation**
William F. Anzalone, Esq.	Plastics failure	**Devito** vs. Wal-Mart
Baker & Botts	Patent dispute	Phillips Petroleum Company vs.**Exxon Corporation**
Ballard, Spahr, Andrews & Ingersoll	Contract dispute	RCH/Spacemaster Corportation and Morgan Marshal Industries vs. **T.C.Millwork, Inc.**
Bamk. Sheer & Seymour	Chemical disposal	NY State vs. **Hudson Photographic Products**
Bouchard & Mallory	Equipment malfunction	**Tingle** vs. Sears, Roebuck and Co., Emerson Electric, and Whirlpool Corp
Calgon Carbon Corporation	Freedom to operate	**Calgon Carbon Corporation**
Carella, Byrne, Bain, Gilfillan, Cecchi, Stewart & Olstein	Patent dispute	**Joanell Labs** vs. United States
Carmody & Torrance	Patent dispute	**MacDermid Graphic Arts, Inc.** vs. DuPont

Continental Risk	Personal injury	**Defendant**
Cushman, Darby & Cushman	Patent dispute	**Schenectady Chemicals, Inc.** vs. BTL Specialty Resins Corp. et al.
Dorsey & Whitney	Patent dispute	KX Industries vs. **Procter & Gamble**
Duane Morris	Patent dispute	**Sears Petroleum** vs. Cargill
Dupree & Orloff	Chemical exposure	DeStefano vs. **J.H.W. Construction et al.**
Dwyer & Dribusch	Chemical exposure	**Muller** vs. Nycomed, Inc. and DeDietrich (USA), Inc.
Feder, Koszovitz, Isaacson, Weber, Skala & Bass	Patent opinion	**Jakks Pacific, Inc.**
Feeney, Centi & Mackey	Personal injury	**Plaintiff**
Finnegan, Henderson, Farabow, Garrett& Dunner	Freedom to operate	**MeadWestvaco Corporation**
Fish & Neave	Freedom to operate	**Confidential**
Fitzpatrickk, Cella, Harper & Scinto	Patent dispute	**S. C. Johnson** vs. B. F. Goodrich
Fitzpatrickk, Cella, Harper & Scinto	Patent dispute	**Novartis** vs.Ben Venue
General Accident Insurance	Slip and fall	Quesada vs. **Sam's, Wal-Mart & Hi-Lite**
General Accident Insurance	Fire damage	**General Accident Insurance**
Gibbons, Del Deo, Dolan, Griffinger & Vecchione	Patent dispute	**Newspring Industrial Corporation** vs. Associated Mechanical Devices, et al.
Hartford Insurance	Personal injury	**Defendant**
Howrey, Simon, Arnold & White	Patent dispute	L'Oreal vs. **Procter & Gamble**
Hunton & Williams ***	Benzene NESHAPS	United States (EPA) vs. **Hoeschst Celanese**
Ice, Miller, Donadio & Ryan	Patent dispute	Gilbarco, Inc. vs. **Tokheim Corporation**
Interstate Insurance	Personal injury	**Defendant**

Jaeckle, Fleischmann & Mugel	Environmental, superfund site	State of New York vs. **Solvent Chemical**
King & Spalding	Patent dispute	**Coca-Cola** vs. Pesico and Rapak
Jones, Day, Reavis & Pogue	Patent dispute	**Micro Chemical** vs. Great Plains Chemical
Jones, Day, Reavis & Pogue	Patent dispute	**Microbeef** vs. Lexatron
Kirkland & Ellis	Patent dispute	**Allied Signal** vs. General Electric
McCarter & English	Contract dispute	**ENSR Corportation** vs. Union Carbide
McCarter & English	Patent dispute	**KTV, Inc.** vs. Visual Security Concepts, Inc.
Michael W. Kessler, Esq.	Chemical exposure	**Smith** vs. International Paper
Mullin, Hoard & Brown	Patent dispute	**Micro Chemical** vs. Great Plains Chemical
NYS Attorney General	Consumer fraud	**State of New York** vs. Convenience Store
O'Neile, Cannon & Hollman	Fire damage	**W. R. Grace**
Pennock & Breedlove	Slip and fall	**Alvaro** vs. Equitable Life et al.
Pinsky & Skandalis	Plastics failure	Ludac vs. **Sun State Plastics** et al
Ratner & Prestia	Patent dispute	**KTV, Inc.** vs. Visual Security Concepts, Inc
Rosenblum, Ronan, Kessler & Sarachan	Chemical burn	**Robert Person** vs. Jeff Eaton, Jr. *et al*
Scully, Scott, Murphy & Presser	Patent dispute	Shell Oil Company vs. **ICI Americas**
Skadden, Arps, Slate, Meagher & Flom	Patent dispute	Koslow Industries et al. vs. **Culligan et al.**
Joseph P. Stanley, Esq.	Personal injury	**Plaintiff**
Stikeman-Elliott	Customs dispute	The Crown (Canada) vs. **Importer**
Sugarman, Wallace, Manheim & Schoenwald	Slip and fall	Matzen vs. **Hi-Lite Striping and Wal-Mart**
The Travelers	Personal injury	**Defendant**
Tokheim Corporation.	Freedom to operate	**Tokheim Corporation**

U.S. Department of Justice	Superfund site	Cadillac/Fairview vs. **United States**
U.S. Fidelity & Guaranty	Personal injury	**Defendant**
Ulster County Public Defender	Criminal	People vs. **Michael Bonner**
Weingram & Associates	Patent dispute	Synergistics vs. **Drais Werke Inc.**
Whiteman, Osterman & Hanna	Equipment failure	**BASF** as third party defendant
Wiley, Rein & Fielding	Superfund site	Monsanto vs. **Travelers Insurance et al.**
William F. Anzalone, Esq.	Plastics failure	**Devito** vs. Sam's Club
Wood, Herron & Evans	Patent dispute	Nycomed, Inc. vs. **Mallinckrodt, Inc.**
Zurich-American	Chemical burn	**IBM** as third party defendant
Zurich-American	Chemical exposure	Individual vs. **BASF**

*** Expert witness testimony submitted to the *Supreme Court of the United States*, Hoechst Celanese Corporation v. United States of America, Petition for a Writ of Certiorari, March 23, 1998

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF NEW YORK

SEARS PETROLEUM & TRANSPORT CORP. and SEARS ECOLOGICAL APPLICATIONS CO., LLC, Plaintiffs, v. ARCHER DANIELS MIDLAND COMPANY, DEICERS USA, LLC, GLACIAL TECHNOLOGIES, MLI ASSOCIATES, LLC., AND MINNESOTA CORN PROCESSORS, LLC. Defendants.	Civil Action No.: 03-CV-1120 (DNH/DEP)

CERTIFICATE OF SERVICE

The undersigned hereby certifies that on the 23rd day of February, 2004, true and correct copies of Sears' Memorandum of Law in Opposition to Defendants' Motion to Stay Discovery and the accompanying Affidavit of William Hansen (including exhibits) were served by Federal Express overnight delivery on the following parties:

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Matthew J. Stowell

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF NEW YORK

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